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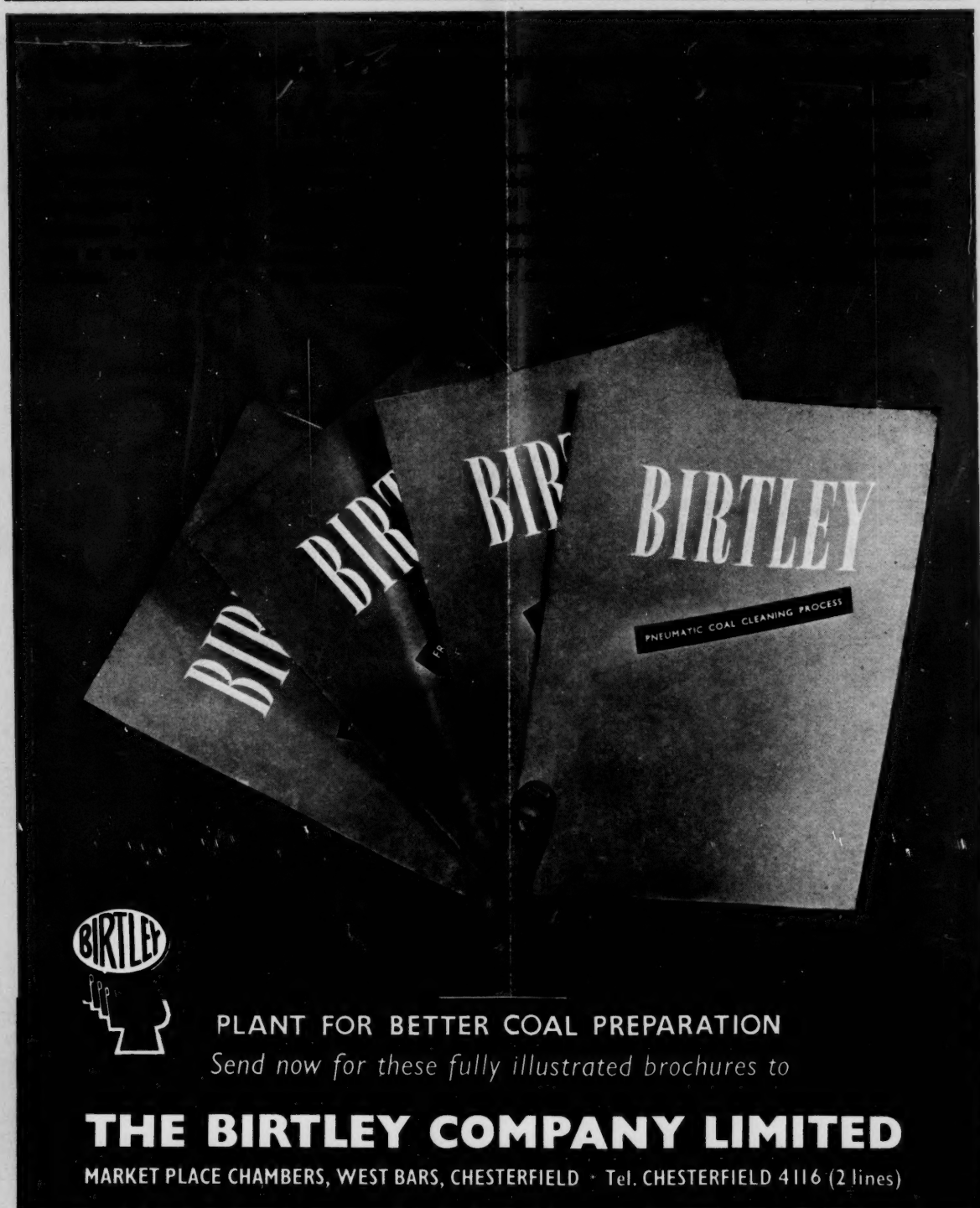

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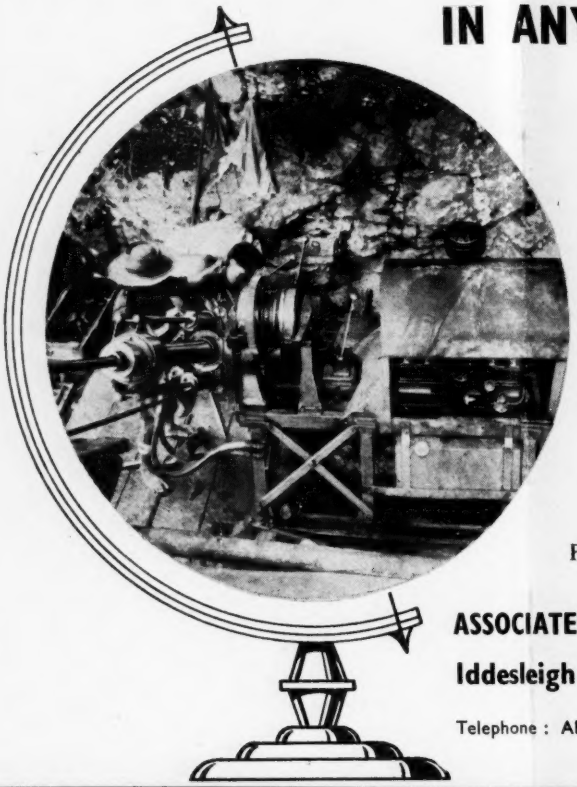

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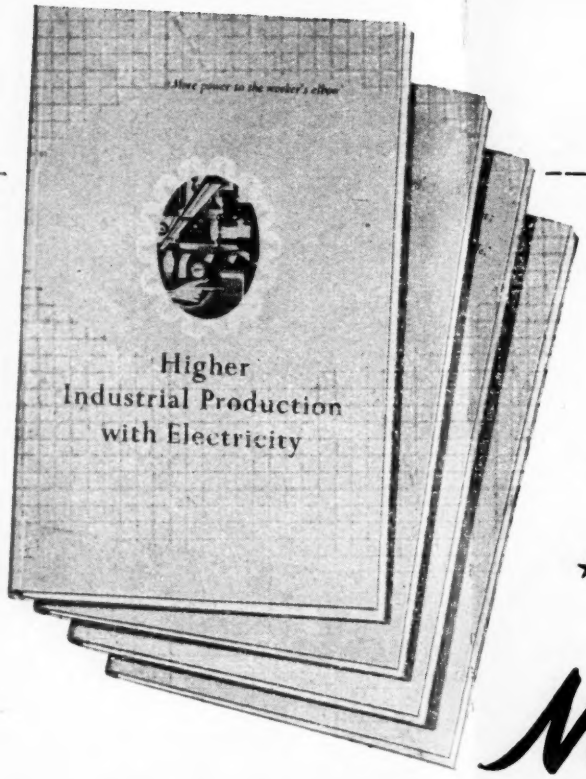

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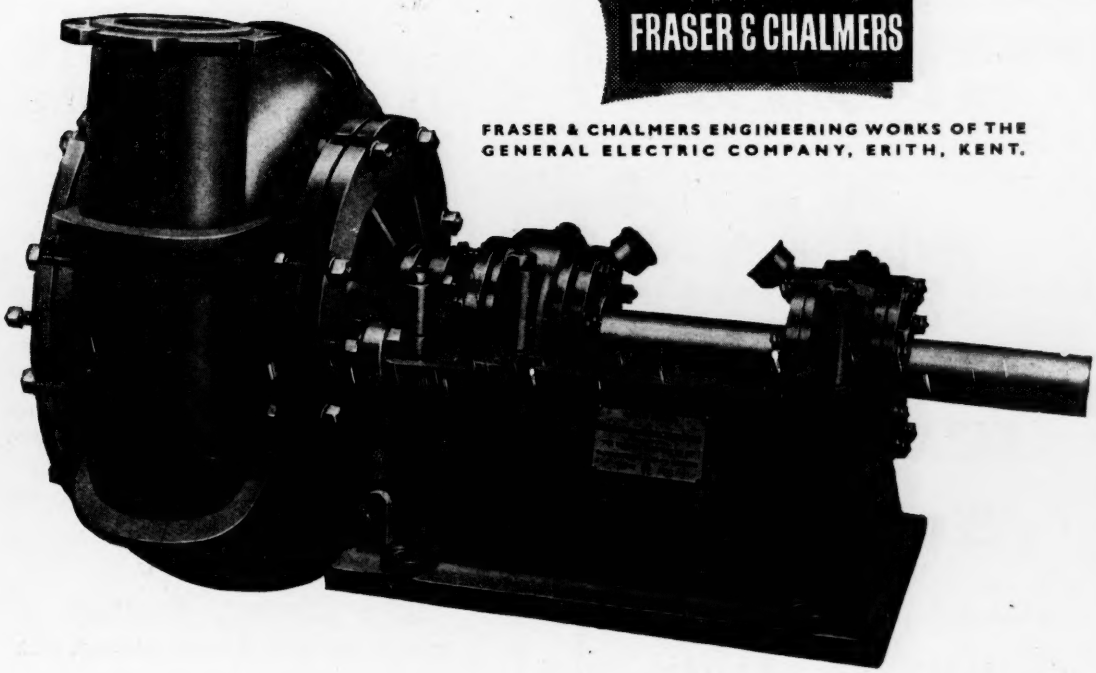

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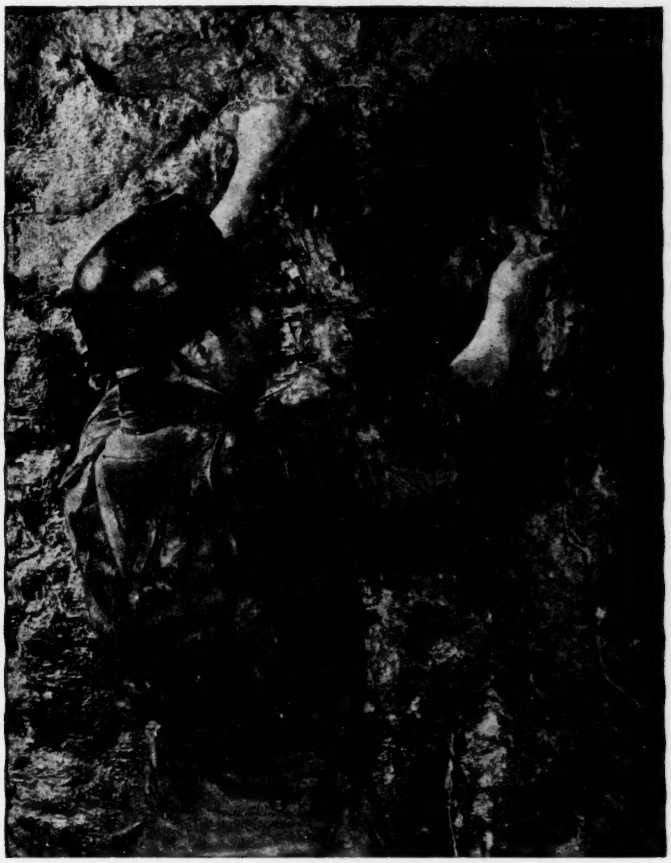

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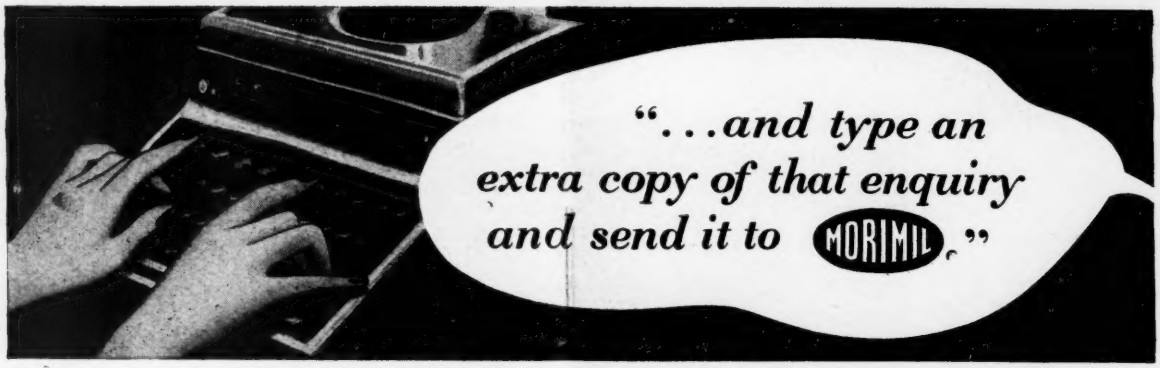

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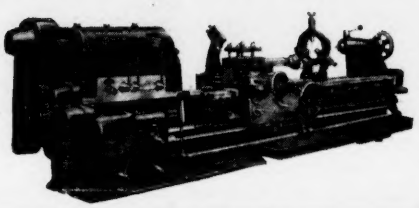

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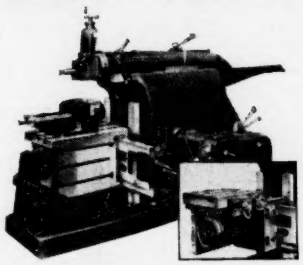

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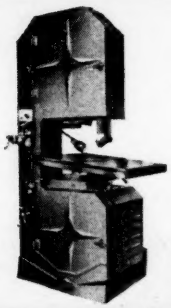

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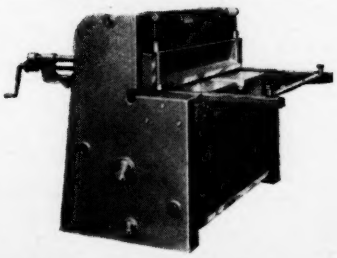

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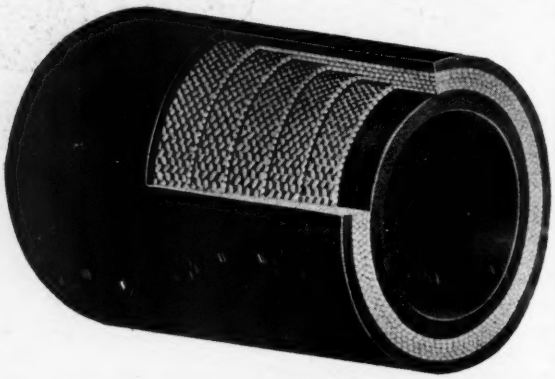

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NOTES AND COMMENTS

Outlook for Industrial Diamonds

The latest figures of diamond sales—both gem and industrial—given on page 431 of this issue, indicate that demand has more than recovered from the slight setback experienced in the June and September quarters of last year. Indeed, net sales of gem stones at over £14,500,000 was the highest figure obtained in any one quarter, and although the sales of industrial stones were not much more than £4,000,000 the total sales figure of £18,573,208 was 16 per cent above the total achieved in the last quarter of 1952.

Despite the uncertainty in the international scene and the persistent currency difficulties still experienced in many countries, gem sales were unusually high. It might have been expected that the recent successful checks to inflationary pressures would have had the effect of curbing demand, particularly as the hoarding of gold is still the traditional means of hedging against unstable currencies in many European and Eastern countries. Part of the rise, of course, can be accounted for by the increase in prices of certain qualities of stones announced last September but these rises were restricted to an average of about 2 per cent, so that their contribution cannot have been the predominant factor.

The decline in the sales of industrial stones has been going on since the third quarter of 1952, a trend which has prompted the belief that the contraction of sales will continue. Generally speaking, this view is based on the belief that the same urgency of demand previously prevalent for rearmament and stockpiling purposes no longer exists. While industrial diamonds are certainly needed to carry out the rearmament programme, it does not follow that with this programme tapering off their uses will be correspondingly diminished.

The above-stated belief would gain more widespread support if it did not implicitly link the demand for industrial diamonds with other commodities labelled as essentially strategic because, in fact, the demand for industrial diamonds is closely bound up with the buoyancy of the United States economy. For the United States is currently importing about 85 per cent of world production, which represents a total of approximately 12,000,000 carats a year. And it has been estimated that as much as 92 per cent of all industrial diamonds are consumed by industries producing the machines and products of industry.

As Mr. A. E. Long has pointed out in his paper, "Industrial Diamonds in the Mineral Industry of North America," if the United States were to find itself without diamonds, its industrial potential would be reduced by as much as 50 per cent in a very short time—a reduction, moreover, in productive capacity which would seriously affect the American economy.

Thus as industrial productivity in the United States increases so the consumption of industrial diamonds increases and if there has been a falling-off in the sales of industrial stones over the last nine months this argument leads to the conclusion that it must be attributed to a falling-off in the consumption of industrial stones by American industry as a whole. However, this statement must be qualified. Firstly, industrial diamonds, like many other commodities, have no doubt shared in the recent recession in certain types of commercial production. This may be merely a passing phase or it may reflect the serious situation of supplies of goods and services exceeding their demand. Secondly, the recent easier position suggested by the March quarter statistics may be due to a temporary slackening-off in stockpile purchases.

In the short run this is a policy the United States can well afford to follow as for several years imports into the United States of industrial diamonds exceeded world production by several million carats per year. However, the diamond mining industry has not shown itself, so far at any rate, capable of easy expansion in the output of industrial stones and with the rapid industrialization taking place elsewhere, the time cannot be far distant when the additional increase in demand for industrial stones will, on present assumptions, outstrip the additional increase in production of industrial stones. It seems, therefore, reasonable to believe that in the longer term the United States will, if its continued industrial expansion is to be achieved, revert to its former policy of acquiring as much of the available supplies of industrial stones as can reasonably be purchased.

Locana Corporation: A New Canadian Company

A new Canadian company is to be formed and will be named Locana Corporation. Major partners on an equal footing will be Hambros Bank and Harrisons and Crosfield, with other participants including a number of British Investment Trusts among them Cable and Wireless (Holding) and the Foreign and Colonial group. Authorized capital will be $5,000,000 with a maximum of $1,000,000 as the initial issue. It is understood that Treasury consent for the dollar expenditure has been obtained. The managing director will be a Canadian, and once the company has been established, participation will be available to other Canadian, United States, and European interests. At the moment a chairman and three directors have been appointed, with Mr. H. J. Williams, president of Harrisons and Crosfield (Canada) in the chair, and it is intended later to increase the Board by adding two or more Canadians and one or more British or American directors.

The main objects of the new Corporation are to aid in the industrial and commercial development of Canada, to assist British companies in establishing themselves in the Dominion, and to provide British and European institutional investors with advice and help in Canada. Locana's prime purpose is thus to act as a link which will help a flow of British and European capital and skill to enter Canada.

It is understood that Locana will embrace three main activities. First, the trading experience of Harrison and Crosfield will be available to those firms wishing to enter Canada, and second, the Corporation will see to the mechanics of any necessary dollar financing. In the third instance, Locana will attempt to organize separately a flow of Canadian portfolio investments to its own shareholders and to other institutional investors in the United Kingdom.

To allow for the reverse traffic of bringing existing Canadian securities to England, the function of Locana will be to provide the services of its Canadian office and possible investment managers for those concerns which do not maintain full Canadian contacts.

The conception of Locana Corporation is thus somewhat different from those conceptions governing recent company formation with an eye to the sphere of Canadian development. For the newly-formed United North Atlantic Securities is to participate financially in establishing Canadian companies and subsidiaries of British companies in the Dominion, while the British Newfoundland Corporation will draw on its own capital for the purpose of exploring areas of Newfoundland and Labrador in order to undertake possible exploitation.

Repeat of a Successful Experiment

On six afternoons during the fortnight beginning next Monday the Royal School of Mines, in collaboration with the British Overseas Mining Association and the Institute of Mining and Metallurgy, is arranging a series of lectures at the School on various aspects of metal mining. This course is in effect a repeat performance of a very successful experiment carried out under the same auspices just two years ago, the purpose of which was to provide a course of lectures on the technical and economic aspects of mining specifically designed for those in the City who, while associated directly or indirectly with the mining industry, were not themselves technically qualified, and in some cases were even quite unfamiliar with the principles and practices of the industry.

Although the syllabus for the present series of lectures will not be identical with that of two years ago, it will, to a large extent, cover the same ground, and will thus be very suitable, either as a refresher course, for those who attended the last series, or as an introduction to the subject for those who missed the 1951 course.

The lectures will cover a very wide field including a discussion of the functions of the mining geologist and of modern methods of exploration, a description of the steps involved in bringing a large gold mine to the production stage, the choice of mining methods dictated by the characteristics of an ore body, and the selection of mining machinery, the metallurgy of gold, a description of alluvial mining, a description of the organization structure of a large mine, together with lectures on labour recruitment and welfare, and health. Problems of mining finance and taxation will also be discussed.

Each lecture period is being so arranged as to leave time for questions and formal discussion afterwards and the School hopes that as many as possible of those attending will find time after lectures to stay on for tea and continue the discussions in the less formal atmosphere of the Common Room.

There is no doubt that the opportunities provided by this course for informal discussion and cross fertilization of ideas as between the technical and lay members of the industry is likely to prove not the least valuable of the benefits to be derived from the course. This is particularly so in view of the large number of persons (over 100) who have registered for the course, who represent a very fair cross-section of the head office staff of our overseas mining companies, and include a number of company directors, in addition to company secretaries, accountants, and others whose work is normally less closely related to the technical problems of the industry.

The undoubted success which attended the first series of lectures, coupled with the large attendance which is expected on this occasion, is in itself eloquent testimony of the useful service which the Royal School of Mines is performing in arranging these lectures, and we trust that the response will inspire the School to establish these lectures as a regular annual feature. It is clearly beyond the capabilities of the most compelling lecturers to deal both simply and comprehensively with so wide a syllabus in the space of six afternons, and it might very well be that from among those who will have attended these first two courses there would be a strong nucleus of students who would welcome a more advanced course next year for which perhaps a little advance reading might even be prescribed.

Anyone wishing to attend the lectures, who has not yet made arrangements to do so, should apply to the Secretary of the British Overseas Mining Association. Telephone London Wall 7451.

Mechanical Extraction of Pillar Coal in N.S.W.

A note in our issue of November 21, 1952, pointed out that the mechanization of collieries in Australia was advancing steadily, although the paramount obstacle laid in the path of this development was the case of the mechanical extraction of pillars which at that time was strongly opposed by the miners' leaders.

Further developments are now reported by our Australian correspondent who, writing under date of March 30, states that the Combined Colliery Proprietors' Association in New South Wales has notified the Miners' Federation that it intends to put machinery into mines for extraction of pillar coal, and has offered to discuss the matter with the Federation before the machines go in. The Federation has accepted this offer but has threatened to call the miners out on strike if there is any attempt to put the machines in before agreement has been reached on all matters. It is to be hoped that the ill-considered opposition to mechanical working of pillars will now be withdrawn, for this attitude has caused the locking up in pillars of some 200,000,000 tons of coal, a considerable quantity of which will be utterly lost.

The Coal Industry

(From Our Coal Correspondent)

March 30.

The second report* of the Ministerial Coal Production Group of O.E.E.C. published recently reviews the coal situation in Western Europe in the light of predictions made a year ago. Some of the forecasts published in the first report were given in the *Mining Journal* for July 25, 1952, and Table I shows how these tallied with the actual results obtained during the first half of the year. Great Britain alone among the member countries exceeded the predicted output but the report states that the three major producing countries succeeded to some extent in overcoming their principal difficulties. A year ago lack of underground workers was considered to be the main problem in Great Britain and Western Germany but the most pressing need in France was to raise the productivity of the existing labour force by making fuller use of machinery and improving methods of working. Table 2 shows that there was a substantial increase in the number of underground workers in Great Britain and Western Germany during the first half of the year, but Table 3 shows that France alone succeeded in raising the output per manshift.

TABLE 1

Production in millions of metric tons.

Country	1952 *Est'ed*	1951 *actual*	*Est'ed increase over* 1951 (%)	1952 *first 28 weeks actual*	1951 *first 28 weeks actual*	*Percentage increase*
Un. Kingdom	229.4	226.42	+1.32	124.85	122.78	+1.69
W. Germany ..	126.0	118.93	+5.95	64.94	63.60	+2.10
France.....	56.0	53.00	+5.66	30.96	29.38	+5.39
Belgium	31.0	29.67	+4.48	16.65	16.05	+3.78
Netherlands ..	12.8	12.42	+3.06	6.68	6.68	—
Saar.....	17.0	16.26	+4.55	8.47	8.96	—5.44
Totals	472.2	456.70	+3.39	252.55	247.44	+2.06

The figures in the first two columns for France do not correspond with those given in the *Mining Journal* for July 25, 1952 since the latter included 1,400,000 tons of lignite omitted in this table.

The aim of O.E.E.C., as set out in the first report, was to stimulate the production of coal in Europe regardless of internal financial arrangements in order to bring the external balance of payments into equilibrium as quickly as possible by reducing the serious drain on dollar resources occasioned by the heavy imports of coal from the U.S.A. It was realized that the methods adopted would necessarily involve the working of many of the older mines on a financially uneconomic basis. The present financial predicament of the National Coal Board, which compelled them to raise the price of coal to home consumers by 10 per cent in March, is largely due to this unfortunate necessity for which there will be no alternative for many years to come. It is pointed out in the report that as long as there is a serious shortage of coal, even the least effectively employed mine worker is likely to contribute more to the national economy than he would be if employed on any other work.

INCENTIVES TO PRODUCTION

The report describes many of the traditional customs which have grown up in the various European coalfields and an analysis is made of their effects on production. Much consideration is also given to incentives which are likely to have the greatest influence on productivity. Coal-face workers throughout Western Europe are paid on piece rates and it is concluded that this is the most powerful incentive although it is admitted that the change over from piece rates to a time rate in the U.S.A. after the introducion of mechancial loaders may ultimately have to be emulated in Europe. Other incentives taken into consideration include bonus schemes of various kinds, mainly in the form of rewards for regular attendance at work. In Great Britain coal-face workers get a bonus of about 16 per cent on their average earnings for full attendance during a five-day week.

TABLE 2

Number of underground workers.

Country	*At January* 1 1952	*At July* 5 1952	*At July* 7 1951
United Kingdom	542,188	557,160	543,022
Western Germany ..	312,962	318,238	307,273
France	171,381	169,387	169,259
Belgium.....	119,907	119,195	113,737
Netherlands	29,330	29,883	27,708
Saar	38,362	38,329	38,285

The voluntary Saturday shift does not count as a normal shift for this purpose. At present the coal output in Western Europe is being boosted to a considerable extent by overtime working; in Great Britain the extra Saturday shift adds about 12,000,000 tons to the annual output. In view of the importance of overtime to the overall results the Ministerial Coal Production Group have recommended the Governments concerned to give serious consideration to the remission of income tax on overtime earnings but so far only the Netherlands Government is taking any active steps to act on this suggestion.

DOMINANT CONSIDERATION OF EXPEDIENCY

Developments which are now taking place at Crookhill Colliery in the Durham Division of the National Coal Board emphasize the fact that financial considerations must sometimes be subordinated to expediency under present day conditions in the coal mining industry. Here a valuable seam of coking coal lies at a depth of only 50 yd. under private property and since there is urgent need for this coal it has been decided to mine it without causing damage by subsidence by resorting to a system of pneumatic stowing operated from the surface. The seam is only 20 in. thick and stowing is being carried out through a pipe 5 in. in diameter which passes through vertical boreholes into the workings. The pipe is fed with discarded slag from a steelworks; the slag is first crushed and then introduced into the pipe by means of a Bastower machine which consists of a rotating drum with radial pockets in which the material is transferred from a hopper into the compressed air pipe.

TABLE 3

Output per underground worker in metric tons.

Country	*First half of* 1952	*First half of* 1951	*% change*
United Kingdom	197.3	198.8	—0.8
Western Germany ..	194.8	197.2	—1.2
France	166.6	160.5	+3.8
Belgium.....	128.5	133.2	—3.5
Netherlands	213.0	231.0	—7.8
Saar	204.9	212.7	—3.7

The machine is supplied with about 2,500 cu. ft. of free air per minute at a pressure of 30 lb. per sq. in. gauge and the compressor, which is driven by two 120 h.p. electric motors, is of the radial vane type. This plant is capable of filling the goaf at the rate of 90 cu. yd. an hour and the pipe line, when the coal face has reached the end of the panel to be worked, will be 350 yd. long. Two boreholes have been sunk and lined with 10 in. steel tubes to accommodate the two branches of the air pipe and also a conduit for telephone cables. The crushed slag is delivered into the goaf through detachable nozzles.

* Coal Production and Supplies for Western Europe in 1952 and 1953, O.E.E.C., Paris. January, 1953.

Cable Belt Conveying

By A. GRIERSON, B.Sc., A.M.I.Min.E.

Belt conveyor systems play a dominant role in British coal production, although it should not be inferred that conveying is the principal form of underground haulage. In the following article, the author indicates the growing importance to industry of trunk belt conveying, and continues to present a resumé of the mechanics and cost factor of the conveying principle.

The movement of material by means of belt conveyor is not, of course, confined to mining operations, although application in this sphere is more widespread. Latest available figures show that at the present time a cumulative total of 1,800 miles of conveyors are in use in British coal mines, carrying at some stage or other 90 per cent of national output. This does not infer that conveying is the principal form of underground haulage, as much of this 90 per cent is hauled only a comparatively short distance on subsidiary conveyors before being taken over by the primary haulage system. This may be locomotive, belt, or as is more common, some form of the rope haulage. These primary haulage systems operate on roads frequently many miles in length, hence being responsible for the greater amount of ton-mileage.

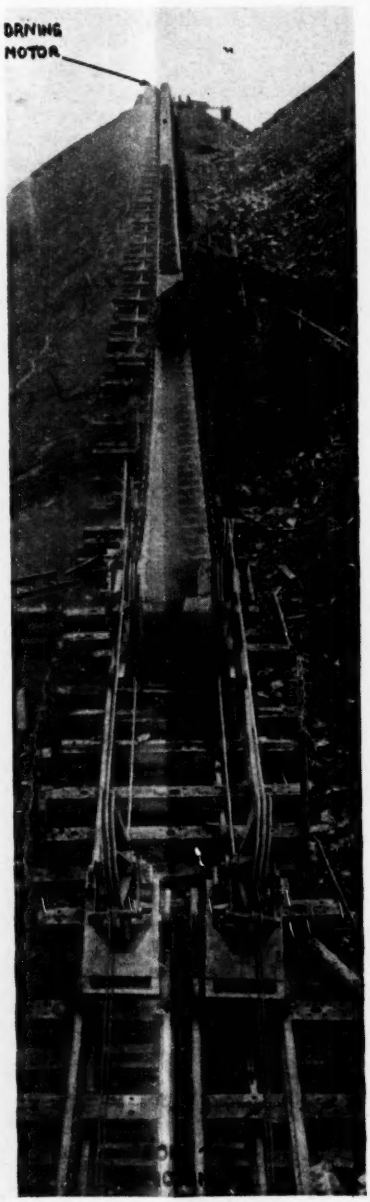
A SUITABLE TRANSPORTATION MEDIUM

With ever increasing mechanization and the installation of power loading machinery at the coal face, a transport medium is required able to adequately deal with the sudden rushes of coal delivered by such machinery. Too often, haulage has been the weak link in the chain of mining operations. Peak loading periods offer no difficulty to belt conveyors which can be constructed to handle any quantity of most material, the actual carrying capacity being dependent upon the following factors: Width of belt; angle of troughing of idlers; angle of slope, density and size of material carried; degree of efficiency with which the load is fed and maintained upon the belt; speed of belt travel.

Belt conveyors range in width from 18 in. to 72 in. and travel at speeds from 150-600 ft./min. As an indication of the extremely high carrying capacity of conveyor belts, tests have shown that a 60 in. wide belt travelling at 300 ft./min. can handle 1,100 tons of coal per hour. The capacity of such a belt carrying heavier material, for example, iron ore, will be even greater. Conveying possesses the inherent advantage of continuous flow of material; better by far than the intermittent delivery of other forms of haulage. Haulage accidents are less frequent and what is probably the most important consideration, the man power required to operate a conveyor system is low. This is borne out by the Reid Report on Coal Mining which focused attention on the unsatisfactory haulage facilities in general use, the Report stating that for a given labour force trunk belt conveying can handle a larger tonnage than any other system of haulage.

This fact has long been recognized in other industrial undertakings, ranging from power stations to granaries. In the realm of Civil Engineering the Shasta Dam project demonstrated the fact that if high tonnages are contemplated length of haul need offer no insurmountable problem. Here 10,000,000 tons of gravel were conveyed on a 10-mile system at a cost in the region of 10d. per ton. At the present time a project is contemplated involving the movement of material 103 miles across country, between the shores of Lake Erie and the town of Midland on the River Ohio in Pennsylvania. This will involve a two-way conveyor system; ore from Lake Erie being carried south and coal from the rich Pittsburgh field travelling north. It is estimated that this transport system when carrying coal will result in a saving of 7s. 6d. per ton over rail freight charges when handling an output of 15,000,000 tons per annum. This saving will increase to 10s. per ton on an output of 20,000,000 tons. The corresponding saving in transport costs when dealing with ore is 4s. per ton on an annual tonnage of 32,000,000. The haulage system will involve a total of 172 orthodox belt conveyors of 72 in. width travelling at 600 ft. per min. Because of objections raised by a railroad company this scheme is at present in abeyance but such figures will forcibly bring home the immense potentialities of major belt conveyor installations.

The reader may well at this juncture pose the question, "Why, in view of its undoubted advantages, is belt conveying not applied more fully as a primary haulage system?" To give a satisfactory explanation to this question one must consider the elementary mechanics of conveying.



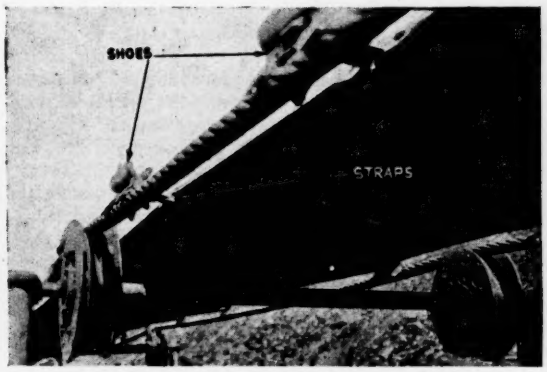
The alignment of pulleys to allow for free passage of ropes

MECHANICS OF CONVEYING

An orthodox conveyor consists in the essentials of the driving unit and return drum; the intermediate structure, the belting.

Design and construction of the first two factors offer no major problem and it is the belting itself which lays claim to the greatest consideration. Upon the belting depends the maximum h.p. that can be transmitted and in consequence the capacity and ultimate length of the conveyor. It is the belt that carries the stress due to friction and gravity; the driving unit merely existing to transfer the necessary power from the motor to the belting.

There are different types of belting, most common of which is the rubber belt, consisting of layers or plies of cotton duck fabric cemented together and covered by rubber. The actual strength of the belting lies in the fabric which may be of cotton or other suitable material of high tensile strength. With normal fabric, continued stress in excess of say 30 lb. per in. per ply results in harmful effects. Thus in effect the maximum advizable working stress in a 30 in. wide 5-ply belt is 4,500 lb. The product of



A carrying shoe is fitted to each end of the strap

effective stress and belt speed is the maximum h.p. belt can transmit, this available h.p. being required to perform the following functions: (i) Overcome the frictional resistance of load and rotating components; (ii) Lift belt and load against gravity if on incline; (iii) Lift belt and load from every trough between idlers.

As the frictional resistance of well lubricated ball bearing idlers is very small factors (ii) and (iii) are by far the heaviest drain on power. The following table clearly illustrates the limitations of rubber belt conveyors operating on inclines. The conveyor is 30 in. wide 5-ply construction, and is carrying 150 tons per hour at 300 ft. per min. The maximum operating lengths are those determined purely by consideration of allowable belt tension.

Operating condition ...	Level	1:10	1:5	1:3
Maximum length ...	680 yd.	340 yd.	230 yd.	155 yd.

It must be borne in mind that these values cannot apply to every installation as so much depends on degree of efficiency with which the conveyor is installed and maintained.

THE COST FACTOR

The optimum length of conveyor run could, of course, be increased by the introduction of stronger belting but this would create attendant difficulties; financial considerations being not the least of these. Rubber belting is by far the most expensive item in a conveyor system costing upwards of £1 per ft. depending on width and quality. The cost of 8- or 10-ply belting would in many cases preclude use, as working life is comparatively short. Recent investigation of a number of underground trunk conveyor belt installations showed that belting accounted for almost 66 per cent of the total annual cost of operation (excluding labour costs). The official figures of the National Coal Board for the year 1949 disclose that £12,000,000 was expended on the purchase of belting in that year alone. The subsequent rises in cost of cotton and rubber may cause even this figure to be exceeded in later years.

As belt conveying is so well suited for the more usual methods of coal mining, it is undeniably an excellent subsidiary haulage medium, but for high capacity long hauls where prolonged gradients are in evidence, orthodox belt conveyors are at a disadvantage because of the limitations of the belting.

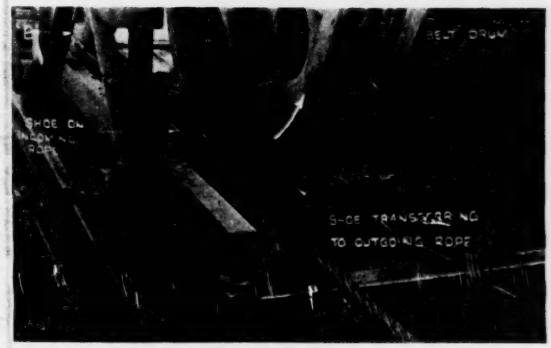
The introduction of the cable belt conveyor has removed these limitations. This is essentially a heavy duty long distance belt conveyor in which steel wire ropes or cables are utilized to take the stress normally taken by the belting. This latter carries only the load. The basic principle is not new but the recent cable belt conveyors installed at Frances Colliery, in Fifeshire, and other mines embody a new conception of design. At Frances Colliery the cable belt conveyor displaced three orthodox conveyors operating in series over a combined distance of 760 yd. on an adverse gradient of 1:4. In the first year of operation the cable belt conveyor carried over 250,000 tons of coal.

THE BASIC PRINCIPLE

The basic principle of the cable belt conveyor is that the carrying belt of single ply 32 oz. cotton duck fabric runs between two steel ropes. This belt has moulded into its construction spring steel straps at approximately 2 ft. 6 in. centres, extending across the belt and projecting for a few inches on either side. A carrying shoe is fitted at each end of the strap. The shoes have rubber inserts top and bottom, the entire shoe sitting on the steel cable thus supporting the belt between the cables. A load placed upon the belt causes it to assume a troughed shape, the weight of the belt and the material being taken by the cables. Under working conditions it has been shown that the grip of the shoes on the ropes is sufficient to prevent any movement of the belt relative to the rope. Although the grip of the shoe is strong it is not harsh, the rope nestling snugly into the shoe insert. As no slip occurs between shoe and rope, the belt and the ropes travel as an integral unit.

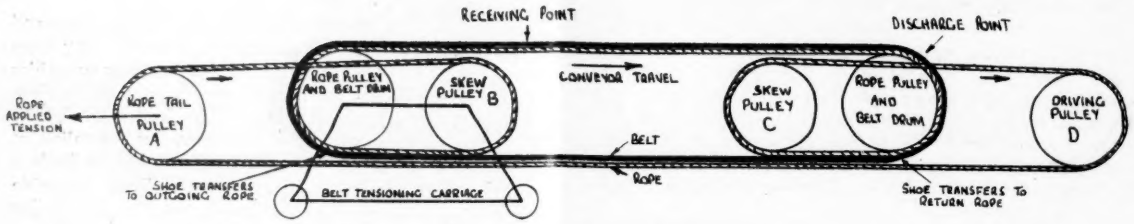
The ropes are driven by two Koepe driving pulleys mounted on separate half shafts coupled together by differential gearing, such a drive ensuring that the two separate ropes are driven at exactly the same speed under all conditions of loading The differential also compensates for any variation in the diameter of the driving pulleys due to wear.

A longitudinal section along the conveyor is shown in the illustration overleaf and the rubber belt is constrained to revolve about two terminal drums. The rope



Attachment of the carrying belt to the cables

after leaving the driving pulley D picks up the carrying shoe at the point indicated, thus supporting the belt along the length of the conveyor up to the tail end belt drum. At this point the rope continues along towards the rope tail pulley A whilst the shoe, which in effect becomes inverted, continues round with the belt and re-engages immediately with the rope returning from skew pulley B. This simple and ingenious transfer arrangement is repeated at the discharge point. As will be seen from the previous illustration, pulleys A and B are slightly skewed to allow free passing of ropes.



A longitudinal section along the conveyor

The cables are supported along the length of the conveyor run by ball bearing pulleys set at 4 to 9 yd. centres, the intervening distance between pulleys being governed by conditions of operation. As the belt itself does not run over idlers as in an orthodox conveyor, belt sag between idlers is eliminated. Thus there is no power wasted in the continual lifting of the load from the troughs between idlers, resulting in a substantial reduction in h.p. to drive the conveyor. In addition, the belting is not subject to the heavy deterioration caused by continual flexing under stress. A further advantage lies in the fact that only at the terminal drums is the carrying belt in contact with any surface, this resulting in the elimination of abrasion of belt by friction.

ATTACHMENT OF CARRYING BELT

The previous illustration indicates the attachment of the carrying belt to the cables and the support of the latter by the ball bearing pulleys. The ropes shown are 1⅛ in. diameter flattened strand 100/120 tons steel. The ropes are maintained at the requisite tension by means of the tail pulleys A.

Belt tensioning can be effected independent of rope tension by use of the tensioning carriage. Movement of this carriage will have no bearing whatever on the tension existing in the ropes. The capacity of the cable belt conveyor is rather greater for equal width of belt, this being attributable to the complete lack of jolting of material while on the belt. Consequently the belt may be more fully loaded. The maximum angle against which material can be conveyed may be increased beyond the angle of repose of material on the belt, as due to the fact that at no time is carrying surface of the belt in contact with conveyor structure, slatted bars may be placed transversely across belt and so effectively prevent material rolling back.

The National Coal Board has ordered cable belt conveyors for a number of mines: the conveyor to be installed at the Argyll Colliery, Machrihanish, Argyllshire, will have a vertical lift of 1,080 ft. in a distance of 6,000 ft. This will constitute the highest lift of any single belt conveyor in the world so far as is known. If orthodox belt conveyors had been employed under these conditions, series operation would have been required, this requiring in the interests of safety a belt attendant at each discharge point.

CORROSION—II.

The War Against Corrosion

By A. G. THOMSON

In this, the second and final instalment of an article which began in our issue of last week, the author indicates the tremendous damage caused annually to buried metals by corrosion. He emphasizes the value of cathodic protectionary measures, and makes mention of the considerable activities of research which are taking place to combat the losses caused by corrosion.

So serious are the losses caused by the corrosion of buried metals that a symposium on this subject was held in London in December 1951. It was organized by the Iron and Steel Institute in conjunction with the British Iron and Steel Research Association and the Corrosion Group of the Society of Chemical Industry. There are 500,000 miles of buried pipe lines in the United States and the annual cost of replacement—most of which is probably due to corrosion—is believed to be about $200,000,000. In Britain there are 80,000 miles of water mains alone, many of which are laid in aggressive clay soils. The petroleum and mining industries use large quantities of buried metal in the form of pipe lines, underground cables, etc. Pipe lines laid without protection are provided with walls of a thickness exceeding that required for operating pressures. With adequate external protection, however, the wall thickness can be reduced 20 to 35 per cent. On 225 miles of 8 in. diameter pipe reduced in wall thickness from 0.322 in. to 0.25 in., the saving in steel would be 3,700 tons. Moreover, the reduction in wall thickness would provide a pipe of larger internal diameter with an increase in capacity of approximately 5 per cent. Based on the length of all pipe lines in the United States, this increase would be equivalent to almost 50,000 miles of pipe. It is evident, therefore, that a high expenditure on protection is justifiable if the life of buried pipes can be increased, bearing in mind that the cost of laying the pipes may be several times greater than that of the pipe material itself. Vernon (6) regards an expenditure on protective measures of 30 per cent of the cost of the pipe as not unreasonable. Attention is being directed to the use of more efficient protective coatings, supplemented by electrical methods of galvanic protection.

VALUE OF CATHODIC PROTECTION

It is now generally appreciated that a properly designed cathodic protection installation will protect a buried steel structure indefinitely. According to Spencer (7), corrosion of a buried or submerged structure is generally the result of one or more of four causes:

(a) The concentration-cell effect, occurring where changes in the concentration of soluble salts in the soil along the length of a pipe line causes the areas of higher concentration to become anodic. This is the principal cause of pipe line corrosion in the Middle East;

(b) The electrolytic-cell effect caused by stray direct currents resulting in a variation in the potential of a buried pipe line relative to the soil;
(c) The galvanic-cell effect, caused by contact between dissimilar metals;
(d) The bacterial corrosion in anaerobic conditions which is the chief cause of underground corrosion in Britain. Sulphate reducing bacteria accelerate corrosion from this cause by removing hydrogen on polarization.

Whatever the cause, the corrosion of metals underground is associated with a positive electrical current flow from the metal to the electrolyte at the anode—the point of corrosion. Cathodic protection is based on the simple conception that if sufficient electrical current is flowing uniformly into the metal surface from the electrolyte, the flow from the anode is stifled and corrosion does not take place. Corrosion can, therefore, be prevented by providing a flow of current either from a higher potential scrap-metal anode supplied with an external direct current, or from expendible metal anodes such as magnesium, aluminium or zinc having a higher electrode potential than steel.

Cathodic protection is being used to an increasing extent for oil, gas and water lines, tank bottoms, jetties, ships' hulls, process plant, and buried power transmission lines. It is by no means a new development, but was first introduced in 1824, when Sir Humphrey Davy endeavoured to control corrosion of the copper sheathing on war ships by the current generated by the galvanic corrosion of zinc. This was probably the start of the traditional use of zinc in marine engineering to protect the hulls and shafts of steel ships in the vicinity of bronze propellers. Magnesium and aluminium are also used as galvanic anodes in cathodic protection processes, an important advantage of magnesium being the higher effective potential that is developed. The standard magnesium anode developed in Britain for use on pipe lines consists of a cast cylinder of metal alloy weighing about 22 lb. The largest standard anode weighs 200 lb. and is specially designed for the protection of structures in sea water. The large oil companies were the first to realize the value of this method of protection and in recent years they have effected enormous savings by the installation of magnesium anodes.

CORROSION-RESISTANT MATERIALS

Tremendous progress has been made in the development of corrosion-resistant alloys, for which purpose various scarce non-ferrous metals are extensively employed. Some of the outstanding achievements in this field have been reviewed by Laque (8). The durability of iron has been improved by the addition of chromium and nickel, frequently supplemented by other elements such as molybdenum, columbium, titanium, silicon, copper and tungsten. Some stainless steels have a resistance to corrosion as much as 100,000 times higher than that of ordinary iron. The addition of molybdenum effects a tremendous improvement in the resistance to specific environments of stainless steels. Less spectacular, but none the less important, is the improvement in the resistance of iron to corrosion by the atmosphere that can be secured by the controlled addition of small percentages of such elements as copper, phosphorus, nickel, chromium and silicon in various amounts and combinations. In an industrial or marine atmosphere an increase in the copper content of an open hearth iron from 0.005 per cent to 0.05 per cent will result in a ten-fold improvement in corrosion resistance. Notable improvements have also been effected in the durability of brasses and bronzes by the incorporation of suitable additions. For instance, the addition of about 2 per cent aluminium to a 22 per cent zinc, balance copper, alloy has resulted in considerably increased resistance to the corrosive and erosive effects of salt water at high velocity.

By studying the effects of composition on the corrosion resistance of aluminium and its alloys, a sound basis has been studied for selecting the most suitable alloy for particular purposes. The durability of magnesium in corrosive environments has also been increased, while attention is being devoted to the potentialities of new metals—e.g., zirconium, which has excellent resistance to corrosion.

These developments are all helping to conserve ferrous and/or non-ferrous metals by prolonging their useful lives and ensuring that the most suitable material is used for any given application in which high resistance to corrosion is important.

RESEARCH

If by 1975 we are going to be consuming metals on the scale indicated by the Paley Report, this immense problem of surface deterioration must be solved. Uhlig predicts that in the United States a five-year research, development and educational programme on corrosion control could result in savings of $921,900,000 annually. Hundreds of laboratories throughout the world are engaged in the war against corrosion. Among the largest is the Massachusetts Institute of Technology whose metallurgical laboratory has a budget of nearly $1,000,000 a year largely underwritten by industry. The opinion has been expressed that by providing a new approach to the study of surface behaviour, the "protein bombarder" recently installed at the Stanford Research Institute in California may add to our knowledge of corrosion. New advances in surface metal studies may lead to improvements in electroplating, galvanizing, painting, etc.

In Britain a large number of research organizations are studying corrosion from one aspect or another, among them being the British Iron and Steel Research Association, the British Non-Ferrous Metals Research Association, and the Chemical Research Laboratory.

B.I.S.R.A.'s Corrosion Committee has various Sub-Committees each dealing with a particular aspect such as buried metals, protective coatings, atmospheric corrosion, and methods of testing. A new anti-corrosive paint formulation has been developed and extensive trials of this paint have shown considerable promise of prolonging the life of ships. The corrosion resistance of nodular graphite cast iron is being investigated and a final report on the results of service tests on the corrosion of steel railway sleepers has been prepared. An interim report on steel coal wagons shows that the use of low alloy steels should double the life of the floor plates which up to now have been made of mild steel. It is further stated that the plate thickness of the superstructure of all coal and mineral wagons might be reduced, thus resulting in a valuable economy in the dead load (9). Fundamental investigations into corrosion are being sponsored at Cambridge University, where surfaces coated with cementiferous paints are being tested under atmospheric and immersed conditions.

LONG TERM INVESTIGATIONS

At the Chemical Research Laboratory considerable long-term research is being devoted to the corrosion of metals when buried, immersed or exposed to the atmosphere (10). Research on immersed corrosion includes studies of the influence of surface finish on the corrosion rate of mild steel and the behaviour of low alloy steels in static and moving conditions. Protective coatings are examined by a high speed rotor and an electrochemical technique. Other fundamental work includes the removal and examination of surface oxide films. Apparatus capable of producing climatic conditions more severe than any to be found in the tropics has been constructed for accelerated tests for the valuation of protective coatings on metal to be

exposed to atmospheric conditions. Although much of its work consists of fundamental research, the Corrosion of Metals Group of the Chemical Research Laboratory maintains an advisory service on corrosion problems. By answering the many enquiries received from industry and other Government Departments and by carrying out surveys and personal inspections of damage caused by corrosion, this Group is making a valuable contribution to national productivity.

Reference should also be made to the Research Association of British Paint, Colour and Varnish Manufacturers, who are concerned with corrosion from the standpoint of paint technology.

It is impossible within the space available to do more than paint a broad and necessarily incomplete picture of some of the main aspects of the corrosion problem. At the United Nations Scientific Conference on the Conservation and Utilization of Resources, the Minerals Resources Section devoted considerable attention to the urgency of reducing this unproductive drain on the world's limited metal resources. Improved methods of corrosion control would result not only in the more economical use of metals but also in an enormous saving in time, effort and money.

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The Mineral Resources of Pakistan

The following article, received recently from our Indian correspondent, gives a cross section of the known mineral deposits of Pakistan. Governmental interest is directed towards survey and exploitation activity, and this report strikes a note of optimism for the future of the mineral industry in Pakistan.

While the economy of Pakistan is essentially agricultural, the country is nevertheless possessed of a considerable mineral wealth. In Sind, the Punjab, Baluchistan and the mountainous regions of the extreme north and northwest, as well as in East Pakistan, there are rich mineral deposits.

After the partition of India, the problem of the utilization of the mineral resources of Pakistan was earnestly considered, and the reports submitted by various working parties, often prepared under extremely difficult conditions, now give promise of valuable mineral wealth in the territory. In order to avoid haphazard and unscientific exploration methods, the Government of Pakistan, after consultation with the Provincial Governments, passed the Resolution of Mines, Oilfields and Mineral Development (Federal Control) Act in December, 1951, and undertook the responsibility for the development of mineral resources. A year later the Pakistan Government framed further rules and regulations to govern the development of the minerals industry.

THE PETROLEUM INDUSTRY

At the present time Pakistan's greatest need is a supply of fuel to maintain the production and progress of her industry and commerce. Intensive surveys are being carried out throughout the country in a search for petroleum and coal resources, and commercial quantities of petroleum are obtained in the Jhelum and Rawalpindi districts of the Punjab while oil has also been observed in the Mainwali area.

At Joya Malir, in Jhelum, active drilling for oil is now in progress, and the results so far achieved are reported to be encouraging despite the fact that the oil produced in the area is of inferior quality and is suitable only for road bitumen. Oil was also discovered at Balkassar. Oil prospecting licences have been granted to certain companies for the purpose of exploiting the petroleum deposits of the Punjab, and tests are currently being concluded near the Salt Range and in that vicinity.

Other current activity is reported from Baluchistan, where drilling is progressing in the Sui area of the Bugti tribal territory, while similar work is being carried out at Patharia in the Sylhet district of East Pakistan and at Patiya in the Chittagong Hill Tracts.

The following figures show the increased production of petroleum in barrels up to the termination of 1951; 300,000 bbl. (1947), 425,000 bbl. (1948), 823,552 bbl. (1949), 1,120,973 bbl. (1950), and 1,184,323 bbl. (1951). At present, Pakistan has only one refinery, situated at Attock, near Rawalpindi, which produces motor spirit, superior kerosene, diesel fuel, high speed diesel, furnace oil, mineral turpentine, lubricants (other than aero), and has also a small candle factory.

In a written reply to a question in Parliament on March 18, the Minister of Industries stated that since the enforcement of the Pakistan Petroleum (Production) Rules, 1949, ten mining concessions had been granted to Pakistan Petroleum Ltd., and a pre-exploration licence had been granted in September, 1951, to The Standard Vacuum Oil Co. to enable them to carry out an aero-magnetic survey in East Pakistan.

Pakistan Petroleum had so far prospected in only three areas: (1) Pathaira Forest, where the first well drilled had to be abandoned as there was no hope of striking oil or gas, and where a second well is still being drilled. (2) Patiya area where drilling was started in the district of Chittagong in May, 1952, and is still in progress, and (3) Sylhet Area where the company started drilling the first geological bore in this area in November, 1951. This had to be abandoned due to poor boring conditions. The second bore hole drilled in July, 1952, also had to be abandoned for the same reason. Pakistan Petroleum Ltd. have decided to discontinue this method of obtaining underground structural information, and a detailed geophysical (seismic) survey is now planned.

DEPOSITS OF COAL AND LIGNITE

The importance of coal to Pakistan cannot be over emphasized due to the fact that demand is far in excess of present production. The known deposits of coal in Pakistan coal shows that it can be used in brick burning, North West Frontier Province. An industrial analysis of Pakistani coal shows that it can be used in brick burning, cotton mills, ginning factories, ice plants and glass furnaces. Since 1948, output of coal in Pakistan has shown the following tonnages: 240,777 (1948), 337,965 (1949), 436,750 (1950), and 504,703 (1951).

Recently large deposits of lignite were located in South

Sylhet, East Mymensinghe and the northern Tippera district of East Pakistan. Investigations have not been completed but it is estimated that more than 100,000,000 tons of lignite deposits exist in the Harashpur region. Schemes for working these deposits economically will be made as soon as investigation reports are complete.

In his reply in Parliament, the Minister of Industries pointed out that two foreign firms, Lurgi of Germany and Powell Duffryn Technical Services Ltd., London, have investigated the lignite bearing areas in East Pakistan and have submitted their reports. It is stated in these reports that although peat exists over a wide area, none of the deposits are sufficiently large to justify large-scale development. However, both parties have suggested that a scheme of comprehensive drilling should be undertaken over the whole area to prove accurately the extent of the reserves.

The majority of the East Pakistan lignite deposits occur in the margins of low hills abounding in the area. The area prospected, comprising Sylhet and Tippera, is said to contain a minimum of 200,000,000 tons, occurring in huge irregular lenses with a minimum thickness of 25 ft. The quality of the product is generally poor, but varies considerably in certain instances.

About 800,000 tons of better quality lignite have been proven in a 3 ft. seam below 12 ft. of clay near Sylhet. Further deposits of good quality product have been discovered at Maulvi Bazaar, although this area has as yet not been efficiently surveyed and the quality available is not known.

CHROMITE AND ANTIMONY

Chromite occurs in the hilly tracts of the Hindubagh in Baluchistan, and there is a possibility of its occurrence in Waziristan and Kalat State. Only the deposits in the Hindubagh have been worked since 1915, and during this period some 550,000 tons of high grade chromium have been extracted from the area with fresh deposits being discovered from time to time. No detailed geological survey of the chromite bearing areas has been carried out, but there are abundant indications of considerable deposits.

The methods of prospecting and mining chromite have so far been primitive. The necessity of employing scientific methods and modern implements was impressed upon the industrialists some time ago, and they have placed orders for the necessary machinery and equipment. Some machinery has already arrived. Certain of the industrialists and the Government of Pakistan are interested in setting up a concentration plant or a plant for refining chromite in the country. The possibility of making chromates and bichromates in Pakistan has also been examined.

Production in recent years has been: 20,365 tons (1947), 17,837 tons (1948), 16,922 tons (1949), 18,125 tons (1950), and 17,498 tons in 1951. Pakistan chromite is at present sold largely to the United States and Great Britain.

Antimony ores occurs in the North West Frontier Province and in the States of Chitral and Kalat in Pakistan, although only the deposits of Chitral State have so far been worked. No antimony deposits have been exploited since the partition of the country, and the question of their development on an economic basis and the erection of a concentration plant is receiving the attention of the Government.

During the course of his written reply in Parliament, the Minister of Industries announced that silica sand had been discovered by the Geological Survey of Pakistan in a considerable area of the Sylhet district, but so far was not being exploited.

Silica sand occurs in appreciable quantities in Jungshahi and in the Dadu district of Sind, Mianwali, Makerwal, Dandot, Multan and Jhelum in the Punjab and Paniala and Hazara in the North West Frontier Province. Regular prospecting and mining, however, has been limited to Jungshahi in Sind, where the reserves are estimated to be 315,000 tons. The glass manufacturers of Pakistan are mainly interested in the Jungshahi deposits, as the samples of glass manufactured from this sand by a British firm in the United Kingdom have proved comparable to imported qualities.

SURVEYS IN EAST BENGAL

In his announcement to Parliament, the Minister of Industries said that concessions to exploit engineering stone were granted by Provincial Governments and not by the Central Government. A survey for engineering stone had, however, been carried out recently by the Geological Survey on the northern border of the Sylhet district and the Chittagong Hill Tracts, and the report of the survey had been passed to the Ministry of Communications and the East Bengal Government.

He stated also that the Geological Survey of Pakistan has already carried out the necessary investigations concerning iron ore in East Bengal. The survey had observed occurrences of iron ore in the Province at various places in isolated patches.

OTHER MINERAL DEPOSITS

Considerable deposits of limestone are found in Sind, Baluchistan, the Punjab and the North West Frontier Province. Production of limestone in Pakistan during the period 1947 to 1951 has been: 341,000 tons (1947), 346,906 tons (1943), 280,233 tons (2949), 303,295 tons (1950), and 343,956 tons (1951).

Magnesite veins occur in Baluchistan and Kalat State. Initially, the mining of magnesite proved highly expensive owing to heavy freight charges, but at the intercession of the Department of Mineral Concessions, the railway authorities agreed to a reduction of the freight charges in order to make the mining of magnesite a commercial proposition.

Sulphur deposits occur in various areas in Baluchistan, Kalat State, the North West Frontier Province and near Jacobabad in Sind, but the principal deposits are found in Koh-i-Sultan in Western Baluchistan. The ores extracted from these deposits have a free sulphur content of up to 60 per cent. However, the successful working of these deposits on commercial lines largely depends on making arrangements for the refining of the ore at the source.

Bauxite has been located at Nikial, 25 miles from Kotli. About 2,500 tons are available for easy quarrying and various other deposits in the Nikial area total 5,000,000 tons. Recently, near the borders of Azad Kashmir, 500,000 tons of bauxite were discovered.

Celestite deposits have been found near Daud Khel, in the Mianwali district in the Punjab, and in Thana Bulla Khan of the Dadu district in Sind. A few hundred tons of celestite were worked in Sind and supplied to the Burmah Oil Company, who used it for weighting drilling muds during their operations.

The known deposits of gypsum in Pakistan are in Punjab and Baluchistan. There is also a small yield in Sind. The reserves, which are mainly located in the Punjab, total more than 30,000,000 tons, although the known annual production is estimated to be 16,200 tons. This output meets the requirements of cement factories.

Certificates of approval have been granted in Pakistan for the exploration of the following minerals in addition: asbestos, barytes, bentonite, beryl, copper, feldspar, iron ore, manganese, magnesite, marble, ochre, radio-active minerals, soapstone, and strontium minerals.

Correspondence

SWAZILAND ADMINISTRATION AND MINERAL OUTPUT

To the Editor, *The Mining Journal.*

Sir,—May I draw your attention to certain inaccuracies concerning Swaziland in your " Notes and Comments " in your *Mining Journal* of January 16.

The Cape Colony had little to do with this Territory. From 1890 to 1894 the United Kingdom and the Transvaal Republic established a form of condominium. This was replaced in 1894 by an arrangement by which the Transvaal Republic protected and administered Swaziland without incorporation. After the Boer War by right of conquest these rights were taken over by the Transvaal Colony and the administration was under the Governor of that Colony. In 1906 the control was passed to the High Commissioner for South Africa and in 1907 a Resident Commissioner was appointed.

With regard to the possibilities of mineral development, in this Territory only, there is a mineral production of chrysotile asbestos, tinstone, and barytes which was valued at just over £2,000,000 in 1952. There are also other deposits and prospects of *inter alia* coal, columbite, diaspore, fluorspar, kaolin, monazite, pyrophyllite, tantalite, and yttrotantalite.—Yours faithfully,

Director, Geological Survey Department, Mbabane, Swaziland. H. J. R. WAY. March 19, 1953.

[*We are obliged to Mr. Way for the details of the administrative position in Swaziland from* 1890 *to* 1907. *The " Note and Comment " referred to was necessarily compressed.*

The information regarding mineral production in 1952 *is particularly welcome. In this connection we would point out that in an article appearing in* The Mining Journal *of December* 28, 1951, *page* 666, *entitled " Exploration and Development in Swaziland," the possibilities of mineral development in the territory were discussed. It was stated there that among the mineral possibilities being actively prospected were proved deposits of barytes, coal, diaspore and haematite, as well as further occurrences of asbestos (chrysotile and tremolite), calcite, columbite, euxenite, fluorspar, galena, gold, kaolin, monazite and pyrophyllite.—Ed.,* M.J.]

REVIEWS

Economic Survey of Europe Since the War.—*A United Nations Publication. Prepared by the Research and Planning Division Economic Commission for Europe. Pp. 385. Price $U.S.3.50, 25s. stg.*

The present survey is the sixth in a series of reports prepared annually by the Secretariat of the Economic Commission for Europe to serve the needs of the Commission and to assist in the task of reporting on world economic conditions which the Economic and Social Council of the United Nations has entrusted to the Department of Economic Affairs. Since the first report, published in 1948, the main emphasis in the studies has been on developments in the year ended considered against a background of Europe's long term problems.

The report under notice continues this tradition and concentrates on major problems and policies. It is not, therefore, in the nature of a detailed chronicle of economic events.

The survey is divided into four parts. Part 1 analyses the main features of Europe's economic position in the post-war world; Part 2 examines the aims, methods and varying successes of economic policy in different countries; Part 3 reviews the extent and nature of progress maintained since the war in carrying out the basic readjustments required in the international trade and payments position of western Eruope; and Part 4 studies manpower trends and against this background emphasizes three major industrial sections, namely agriculture, textiles and heavy industry.

The survey concludes with a discussion of the efforts made towards greater economic integration within Europe.

The Stock Exchange Official Year Book 1953.—*Volume 1. Thomas Skinner and Co. (Publishers) Ltd. Pp. 1,635. Price for the two volumes £7 net; by post inland £7 3s. 6d., abroad £7 5s.*

Volume 1 of the 1953 edition of *The Stock Exchange Official Year Book* is now ready. This volume contains special chapters on Government, Municipal and County Finance and presents information on Government Securities, including Dominion, Colonial and Foreign, and on the securities of Municipalities and other corporate bodies, including the Boards of the Nationalized industries.

The company sections embrace railways, banks, breweries, insurance, investment trusts, iron, coal and steel, shipping, rubber, tea and oil; and include all stocks and shares except the commercial, industrial and mines sections which are contained in Volume 2 to be published in September. As to nationalization developments, the table of compensation values of securities taken over by the Iron and Steel Corporation of Great Britain is now complete and particulars of the companies whose securities are now owned by the Corporation are included in the iron, coal and steel section.

Summaries of the German and Japanese debt settlement plans are given in the supplement at the end of the book. The new scale of minimum commissions and the scale chargeable to country brokers have been added to the compilation of useful data given in the general information section.

The Northern Miner Annual Review.—*Published by The Northern Miner, Canada. Pp. 112. Price 20 c.*

Comprising eight sections of newspaper size, this unique publication opens with a letter from Mr. St. Laurent, Prime Minister of Canada, and contains a cross section of interesting articles on mining activity in the Dominion.

Canada's impressive future as to minerals development is early stressed, and further articles on the wealth of Sudbury, the growth of railways in keeping with expansion of the mining industry, as well as the rise in stature of industrial minerals, all add a value to the publication. Financial aspects of the industry receive prominent mention, and the fourth section is given over to a review of Canadian minerals. A bold headline indicates possible trends of development by stating " Future Mineral Shortages a Myth."

Well printed and presented, this is a most interesting publication.

Higher Industrial Production with Electricity.—*Published by the British Electrical Development Association. Pp. 146 with illustrations. Price 9s. post free and obtainable from The British Electrical Development Association at 2 Savoy Hill, London, W.C.2.*

The volume under notice is the introductory work of B.E.D.A.'s Electricity and Productivity series of eight books, and in a preface it is pointed out that only by using more and better machines can those industries paying high salaries meet the competition directed from countries having lower wage levels.

This volume contains 104 illustrations selected as being representative of the latest industrial practice, and the nine chapters deal respectively with industrial power and productivity, factory layouts and electric installations, lighting for production, electric motors and control gear, materials handling, electric furnaces and heat treatment in the production line, welding, electrical testing and inspection, and electricity and productivity service. A comprehensive publication that gives a happy indication of what is to follow.

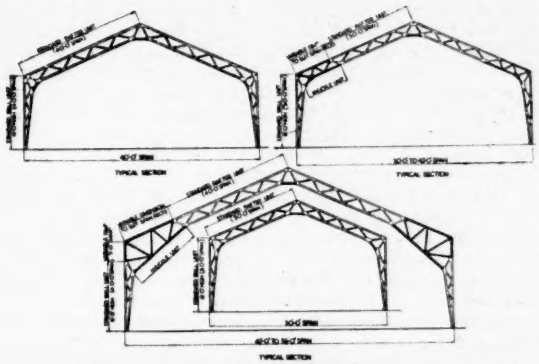
The Diamond Tool Industry in 1952.—*Published by Industrial Distributors (Sales) Ltd., Industrial Diamond Information Bureau. Pp. 8. Available from the Bureau at 32-34 Holborn Viaduct, London, E.C.1.*

A short survey of the diamond tool industry in 1952, dealing with scientific aspects of the industry, and hardness testing, wear and abrasion testing, shaped diamond tools, diamond truing tools, rock drilling and other facets of overall production. The report presents 139 references to other sources of information.

MACHINERY AND EQUIPMENT

Prefabricated Aluminium Alloy Buildings

The main disadvantage of any type of mass-produced prefabricated industrial building lies in restriction to a limited number of standard sizes. The advantages of quick delivery have then to be weighed against the disadvantage of possible loss of space or headroom due to having to use the nearest standard size available. Chamberlain Industries Limited claim to have solved this problem in their new Chamberlain Light Alloy Building.



Sections of typical prefabricated alloy buildings

The basis of the design of the Chamberlain Light Alloy Building is a two-pinned portal frame, of which there are two standard sizes, 30 ft. span x 12 ft. high to eaves, and 40 ft. span x 12 ft. high to eaves. Each portal frame itself consists of two standard wall units and two rafter units. To obtain greater spans and wall heights, a knuckle unit is used between the wall and rafter members at the eaves. This knuckle unit is not a fixed size, but is designed so that when used in conjunction with the other components it provides a portal frame of the dimensions required within certain fixed limits. The sizes of buildings which can be constructed by this method range from 30 ft. to 56 ft. spans, with wall heights from 12 ft. to 15 ft. In these buildings under twenty per cent of the material has to be specially made, the balance being standard components.

The main advantages of these buildings are first, a speed of erection brought about through the low weight of the aluminium alloy sections, a factor which has enabled special erection methods to be devised. These eliminate elaborate lifting equipment and make for speedy erection of the framework. Second, the material economy that has been achieved by using special Tee-sections in the portal frames. Third, the flexibility of easy erection and transportation and fourth, low maintenance costs.

Prefabricated buildings of all types are being shown at the British Industries Fair (Earl's Court). The Chamberlain Light Alloy Building, already in use in the West Indian sugar industry where it is installed on plantation properties, and in this country where it is used as a permanent winter cover for mobile caravans, has specific qualities which render it of interest to the mining engineer. For use as an erection in any mining camp, whether temporary or permanent, the building may be erected by two semi-skilled labourers and is forwarded as needing no extra preservation against the weather.

Batteries at the B.I.F.

Batteries for all applications are to be displayed by Chloride Batteries Ltd. at the 1953 British Industries Fair. On Stand C301 at Castle Bromwich, the company will exhibit Exide-Ironclad and Exide batteries, modified in design by the development of Porvic, the microporous plastic separator, and corrosion resistant lead alloys.

Porvic is presented as being more than 80 per cent porous and yet is said to give complete protection against internal short circuits. By its use, the manufacturers claim that the cells deliver heavy rates of discharge with the minimum voltage drop, and are in addition storable for an indefinite period.

A typical charging/control cubicle with associated battery of 14 cells will be shown to represent a series to meet the special requirements of public buildings.

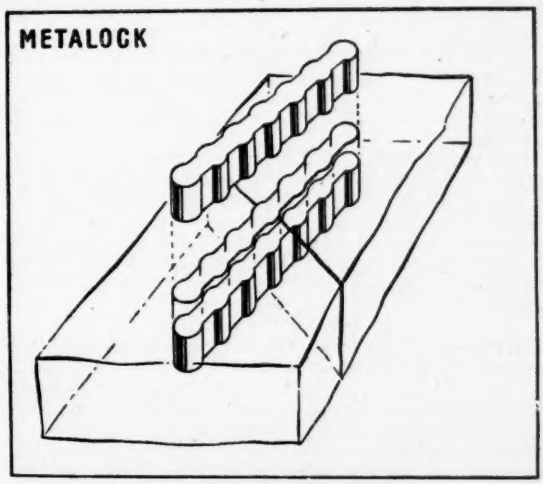
The Metalock Process

The Metalock process embraces a principle based on the nail system used to secure stress-points in wood, developed and adapted for practical application to castings, forged steel and non-ferrous metals, and becomes a principle whereby "keys" are cold-worked individually into slots cut transversely across the fracture or crack, restoring to the individual task a precise degree of strength and flexibility. The precision in each case is carefully calculated relative to the number of keys driven in, which in turn, is governed by the depth the slots are made to cut into the parent metal. The strength of a key is known and thus if the strength to be restored is ten times that of one key, slots are cut to a depth which will take ten keys exactly. The first key is pneumatic-hammered to lock solidly within the parent metal while the second and subsequent keys are power-locked both into the parent metal and against the former key. This is the fundamental principle of Metalock.

The keys, together with the studs and the plates used in two subsequently-developed techniques, are made from a highly ductile, heat-resisting alloy of great tensile strength, flexibility and a low co-efficient of expansion.

A second technique is called "Metalace," a development employing studs in conjunction with the keys to completely seal cracks in boilers, tanks or cylinders against leakage. The third technique, called "Masterlock," is the answer to breaks at points of concentrated stress in sections subject to overloading.

The basic technique of the process is constant for all tasks. Cracks are first clamped in concise alignment and a jig used to drill lines of blind holes in the parent metal, transversely to the fracture. These pilot holes are opened out to size, with their depth calculated to restore a precise degree of strength. The channel of metal between the holes is removed by a gun tool, providing a series of holes connected by parallel sections. Into these apertures the Metalock keys are, one after the other,



The Metalock basic principle

driven into the parent metal by the pneumatic hammers. The job is "finished" with a grinder.

It has been estimated that this "cold stitching" method has saved considerable amounts of time and money in lieu of costly replacements. In 1948 fractures totalling 67 ft. in the winding drums of the Robinson Deep mine in South Africa were repaired by use of the process. One drum was closed for four days and the repair took nine weeks, in shifts planned to avoid any stoppage of production. Other repairs have been carried out on mining machinery in the United Kingdom, France, Spain and Africa.

METALS, MINERALS AND ALLOYS

Uncertainties regarding the future of international relations have further accentuated a general decline in the metal markets and have made for increased uncertainties and hesitation among industrialists and consumers.

COPPER.—The United States picture is of an increasing tendency to stabilize the price of domestic copper at 30 c. per lb. and with the immense stride that aluminium is making it is obvious the big copper interests are anxious to avoid any increase in the price of their metal. Anaconda has reduced its price for domestic copper from 32 to 30 c., Kennecott has conformed with a rise from 27½ to 30 c. and Phillips Dodge has maintained its 30 c. price. These three producers account for the 75 per cent of the domestic output. Copper fabricators have followed suit by establishing new price lists based on copper at 32.60 c. and zinc at 12.08 c. The principal custom smelters have cut their buying price for scrap so as to bring these materials more in line with a 30 c. market for electro. The opinion is growing that the N.P.A. may discontinue monthly copper allocations to consumers. Foreign copper prices are easing; Canadian was called at 33 c. f.a.s. New York. World export price is given at 32/36.15 c. As a result of these price adjustments it is not surprising to learn that there is little demand for Chilean copper at 36½ c.

It is understood that Rhodesian producers will accept the Ministry of Materials proposal to reduce the period of notice to terminate the existing purchasing contract from six to three months. It is expected that the Ministry will give formal notice at the end of April, so that free dealings in copper can begin on the Metal Exchange at the beginning of August.

The "National Days of Prayer" did not seriously interfere with production in Northern Rhodesia as all mines worked normally except Mufulira; even the African miners were taken back again after a brief absence. As anticipated, the Chuquicamata dispute was settled after the intervention of the Finance Minister; the dispute had lasted almost a month. The Chile Exploration Co.s new plant to treat sulphide ores has been started; it is rated at 19,500 tonnes a month capacity. The strike at the Garfield smelter of the A.S. and R. was settled on March 30 just in time to prevent the close of Kennecott's Garfield refinery due to the exhaustion of anodes from the Garfield smelter.

The Ministry of Supply has freed secondary copper and scrap from price control as from yesterday. These products are said to be in good supply and selling below controlled maximum prices. All statutory price control over non-ferrous metals has now ended.

It is reported that a U.S. concern will shortly put into operation a copper mine in Toquepala, about 10,000 ft. up in the Andes in Southern Peru. Deposits are estimated at over 400,000,000 tons of copper ore with an average Cu-content of 1 per cent. This will be one of the largest copper mines in the world and will require an investment of U.S. $160,000,000. Production is expected to be about 100,000 tons p.a. for the first ten years.

LEAD.— Lead, like most of the other metals, has eased with prompt down at £86¼ and three months to 83⅜ on Wednesday. The weakness of lead on the London Exchange has led to the New York price being reduced to 13 c. per lb., but there has been little demand. The Australian Government has lifted the export controls on lead and zinc which should mean that the companies have no longer to reserve a portion of their output for domestic consumers to purchase at reduced prices. U.S. consumption in January rose to 94,366 s.tons from 93,151 tons in December.

TIN.—Tin has been particularly affected by the uncertainties arising out of the Korean negotiations and the more accommodating spirit apparently being displayed by the Kremlin. The price declined on Tuesday by some £70 per ton. London recovered sharply on Wednesday but the Straits price was down to £781¼. American and Continental prices are also lower.

In London practically no buyers have been in evidence and selling pressure has been general.

Uncertainties as to the continuation of stockpile buying by the United States, referred to in our last week's issue, are no doubt one of the main factors influencing market sentiment. *The American Metal Market* of April 1 observed in a leading article, "If the stockpile target has not yet been reached it may be said to be within reasonable distance, especially considering the acquisitions that should result from supplies available for processing plus those which should materialize from commitments already made. Thus the pressure for continuing the accumulation of a stockpile will probably cease to exist before the R.F.C. dies its natural death on June 30, 1954."

It is too early yet to form any opinion as to how far the fall in price will eventually produce contraction in output, and until this becomes apparent the expectation of an early cessation of stockpile buying leaves the unbalanced position between output and production a major influence on market sentiment.

The slump in prices will probably stimulate the international planning school to fresh efforts at bringing into effect international commodity agreements so strongly endorsed in the Paley Report, and may encourage the Tin Study Group, whose Management Committee is to meet next month to communicate directives for an international agreement to the Working Party to convene in Brussels on June 15, to fresh efforts. It appears that at the London Meeting at the end of March the American Delegation, in view of the over-production of tin, somewhat unexpectedly favoured the idea of an international agreement and it is, therefore, thought possible that a new International Tin Conference may be convened before the end of the year.

Straits shipments in March are reported by the Registrar of Malayan Statistics at 6,866 tons, comprising 1,838 tons to the U.S., 1,810 to the U.K., 1,694 to the Continent, 626 to British possessions and 898 to other countries. This figure compares with 4,975 tons in February and was the largest for six months. First quarter shipments amount to 17,500 tons compared with 14,241 tons for the first quarter of 1952. As production has not increased there would seem to be a tendency towards transferring stocks in the Straits overseas.

ZINC.—Zinc has also declined since last week with prompt being £3 down at £74¼ and forwarded £3¼ at £74⅛. Last report from New York say that the metal is in fair demand. The Sullivan Mining and Concentrating Co. is to cut its production of refined from 4,800 to 3,600 s.tons monthly owing to reduced intake of ore.

March output of slab was 83,485 s.tons (76,899 in February). Smelter stocks again increased for the fourth consecutive month to 99,864 s.tons.

ALUMINIUM.— The annual report of Alcan gave the output of the whole combine as 488,300 tonnes last year, and at the end of the period the output had been raised to a rate of 500,000 tonnes.

Pechiney reported an increase in output to 87,370 tonnes from 74,791 tonnes in 1951. The Company is interested in a big deposit of medium grade bauxite in New Guinea but present costs of equipment have postponed any active development.

The U.S. Bureau of Mines report a big increase of bauxite imports into the States last year, the amount shipped being 3,508,196 tons, which with 1,751,845 tons of domestic production gave a total available supply of 5,260,041 tons. Jamaica for the first time figured among the importing countries with a total of 264,988 tons but as usual the bulk of supply came from Surinam with a total of 3,035,272 tons. Imports from Indonesia came to an end after the first quarter.

Olin Industries reports that negotiations are now under way with U.S. Government officials for a supply contract which will enable the company to enter the aluminium field.

NICKEL. — A contract has been signed between the D.M.P.A. and Falconbridge Nickel for future deliveries of nickel, cobalt and copper. The contract calls for production and sale to the U.S. of a minimum of 50,000 s.tons of nickel by the middle of 1962 and a possible additional 50,000 s.tons by mid 1967. A minimum delivery of 1,000 tons is specified by the end of the current year. Falconbridge will also supply up to 1,000 s.tons of cobalt before June 30, 1962, and 26,000 s.tons of refined copper by the end of 1958. This large con-

tract will entail big extensions to existing commitments; two deep level shafts and other lesser ones will have to be sunk, milling facilities must be installed and additional smelting and refining capacity provided. D.M.P.A. has contracts also with the Hanna Coal and Ore Corporation and the Hanna Nickel Smelting Co., subsidiaries of the M.A. Hanna Company of Cleveland, Ohio, for the production of 47,500-62,500 s.tons of ferro-nickel from a deposit in South-West Oregon, the only major known nickel deposit in Continental United States. The Nicaro Nickel Plant in Cuba is now producing in excess of 1,000 s.tons per month of oxide and with a new sintering plant to be installed, it will be possible to convert the oxide into pellets.

QUICKSILVER.—The United States is credited in London with having bought at least 50,000 flasks from the two main producers towards the end of last year. According to a recent Bureau of Mines report, there were imported into the United States last year 68,686 flasks of which 28,121 were received in the last quarter. In that period Spanish shipments were very high and amounted to 17,329 flasks as against 13,608 in the whole of 1951. For the whole of 1952, 26,026 flasks came from Italy; 24,332 from Spain; 10,187 from Yugoslavia and 7,971 from Mexico. In addition there was a domestic output of 12,500 flasks—71 per cent in excess of the 1951 output. On the other hand U.S. consumption last year at 43,000 flasks was 24 per cent down on 1951 when it was 56,848 flasks.

As the position of the world's chief producer is well established even stockpiling requirement should be easily attainable.

TUNGSTEN.—The N.P.A. has issued a statement to the effect that supplies of tungsten ores have increased to some 1,800,000 lb. monthly from the 1,000,000 lb. available in 1951, and that the supply is much greater than the current or foreseeable demand and they are, accordingly, allowing unrestricted use of pure metal, including its use in the production of high speed steels. This is a great change from the forecasts given in the Paley Report. In the U.K. the position is very confused and indications of price are not forthcoming. The N.P.A. has also freed pure molybdenum from use control but it remains under allocation.

Iron and Steel

The "threat" of world peace has touched off a sharp decline in the American stock markets. Commodity prices are falling but the strength of steel is unimpaired. European steel export prices have been increased and it is reported that a number of orders have been booked at prices well above the new minima. German steel producers in fact have largely withdrawn from the export market. Canada, too, is facing a steel shortage despite the attainment of a second domestic output, whilst in this country many industrial problems stem from the shortage of iron and steel supplies.

The extent of the arrears in deliveries at the end of the first quarter was very formidable and the inference is that the issue of authorizations far exceeded the capacity of the producing plants. Receipt of an allocation does not assure delivery of the required material and, in fact, many consumers with the necessary authorizations have got to secure acceptance of their orders for Period II. The steel makers are doing their utmost to meet the demand. Production was almost uninterrupted during the Easter period. Steel workers sacrificed their holiday in the national interest. But still the shortage persists and there has been no reduction of the persistent pressure for prompt supplies.

The urgency of home requirements tends to restrict the vigorous persecution of the export drive. There are abundant opportunities, but thus far the volume of shipments is no greater than the 1952 export tonnage, because of the overriding necessity of keeping up supplies to British consumers.

One favourable factor is the improvement in the flow of raw materials. The coke position is better, works have good stocks of imported ores and the first of the fleet of ore freighters on order for B.I.S.C. (Ore) Ltd. is now in commission. Scrap supplies are also fairly satisfactory. If imported material is scarce and expensive, home collections are maintained and the position has not deteriorated. Thus the outlook for steel is bright and it is hoped that by the autumn, if not earlier, the gap between supply and demand will be bridged.

The London Metal Market

(From Our Metal Exchange Correspondent)

Dealers are still trying to sum up the new situation created by the more favourable political atmosphere. The prices of lead and zinc were marked down on the re-opening of the Exchange after the Easter holiday, but a recovery has since taken place as the expected volume of selling did not materialize. At the time of writing it appears that of the two the lead market is the weaker, and it would not be surprising if the gap between the two prices narrowed considerably.

The tin market has suffered the worst as the peg at 121¼ c. per lb. in America is now of no significance, and with buyers all over the world being very reluctant to enter into new commitments the daily output has had to find a home at considerably lower prices than those ruling last week. The situation is further complicated by the withdrawal from the market of Continental operators who find their transactions greatly hampered by fluctuating prices, and if they and consumers hold off for any length of time the fall in the quotations can quite easily go further. The Eastern price on Thursday was equivalent to £824½ per ton c.i.f. Europe.

Closing prices and turnovers are given in the following table:

	April 1		April 9	
	Buyers	*Sellers*	*Buyers*	*Sellers*
Tin				
Cash	£930	£935	£825	£835
Three months	£880	£885	£802½	£807½
Settlement	£930		£830	
Week's turnover	495 tons		470 tons	
Lead				
Current month	£86¼	£87	£85¼	£85¾
Three months	£84½	£85	£82½	£82¾
Week's turnover	4,550 tons		4,600 tons	
Zinc				
Current month	£76¾	£76¾	£75	£75¼
Three months	£77	£77¼	£75¼	£76
Week's turnover	3,825 tons		2,975 tons	

APRIL 9 PRICES

COPPER

Electrolytic .. .. £280 0 0 d/d

TIN, LEAD AND ZINC

(See our London Metal Exchange report for Thursday's prices)

ANTIMONY

English (99%) delivered, 10 cwt. and over .. .. £225 per ton
Crude (70%) .. .. .. £210 per ton
Ore (60% basis) .. .. .. 20s. — 22s. nom. per unit, c.i.f.

NICKEL

99.5% (home trade) .. .. £483 per ton

OTHER METALS

Aluminium, £161 per ton
Bismuth (min. 4 cwt. lots) 17s. lb.
Cadmium (Empire), 14s. 4d. lb.
Chromium, 6s. 5d./7s. 6d. lb.
Cobalt, 20s. lb.
Gold, 248s. f.oz.
Iridium, £60 oz. nom.
Magnesium, 2s. 10½d. lb.
Manganese Metal (96%-98%) £280/£295
Osmiridium, £40 oz. nom.
Osmium, £65/70 oz. nom.
Palladium, £7 15s./£8 10s. oz.
Platinum, £27/£33 5s.
Rhodium, £42 10s. oz.
Ruthenium, £25 oz.
Quicksilver, £70 10s./£71 ex-warehouse
Selenium, 30s. 6d. nom. per lb.
Silver 74d. f.oz. spot and f'd.
Tellurium, 18s./19s. lb.

ORES, ALLOYS, ETC.

Bismuth .. .. 65% 9s. 0d. lb. c.i.f.
60% 8s. 9d. lb. c.i.f.
Chrome Ore—
Rhodesian Metallurgical (lumpy) £14 18s. per ton c.i.f.
" " (concentrates) £14 18s. per ton c.i.f.
" " Refractory £14 10s. per ton c.i.f.
Baluchistan Metallurgical .. £16 11s. 6d. per ton c.i.f.
Magnesite, ground calcined .. £26 - £27 d/d
Magnesite, Raw .. .. .. £10 - £11 d/d
Molybdenite (85% basis) .. 103s. 10½d. per unit c.i.f.
Wolfram (65%) .. .. .. World buying 310s. - 320s.
" " .. .. .. 352s. 6d. Selling
Scheelite .. .. World buying 290s. - 300s.
" .. .. 342s. 6d. Selling
Tungsten Metal Powder (for steel manufacture) .. .. 30s. 8d. nom. per lb. (home)
Ferro-tungsten .. .. .. 25/3-25/9 nom. per lb. (home)
Carbide, 4-cwt. lots .. .. £35 13s. 9d. d/d per ton
Ferro-manganese, home .. .. £49 15s. 0d. per ton
Manganese Ore U.K. (48%-50%) .. .. .. 6s. 1d. per unit
Brass Wire .. .. .. 2s. 7¼d. per lb. basis
Brass Tubes, solid drawn .. 2s. 1¾d. per lb. basis

THE MINING MARKETS

(By Our Stock Exchange Correspondent)

While the budget and coming South African general election have been occupying the minds of many investors, markets have not maintained their traditional pre-budget sleep. The willingness of the Russians to co-operate in certain international spheres, together with peace talk, brought about a heavy fall in certain commodity prices. Markets have been sensitive for a long time as the demand for base metals eased off, and the latest developments nearly brought it to a head. It should be remembered that no sudden change in policy is likely to occur without very concrete proof of Russian goodwill. Wall Street before and after the Easter holidays suffered two days of violent slump, followed by a sharp rally. The London market, traditionally less volatile, marked many prices down although in a more orderly fashion. Gilt-edged stocks were strong. The gold and dollar reserve figures again showed an improvement and gilt-edged are a traditional haven for investors in times of market uncertainty.

In the Kaffir market conditions were quiet and contango facilities at the end of the account difficult to obtain. The new account, dealings for which began on Wednesday, covers the budget period and the South African elections. Nevertheless, the undertone remained firm. The Rand March mining returns showed many improvements over the February figures. West Driefontein profits cut the £200,000 mark. Libanon were also a feature. The sudden demand for the shares followed talk of good development results on the carbon leader reef. Up to now this has not been an economic reef in this mine, but development operations have been going on in that area and vague rumours talk of good gold and uranium prospects from it.

In the O.F.S. market, share prices closely followed the Rand. They were initially better on hopes of good quarterly figures due shortly and then turned slightly easier at the end of dealings for the old account. Prices remained at the lower level from sheer inanition rather than any pressure of selling.

Among West Africans Ashanti were outstanding. The company produced an excellent March development report. Cross cuts on No. 12 level, where high values were previously exposed, can be considered more than satisfactory. Values range between 5.8 dwt. over 32 ft. to 15.8 dwt. over 67 ft. On the 35th level, at the bottom of the mine, a cross cut gave the excellent figures of 44.2 dwt. over 17 ft. Amalgamated Banket report a record net revenue of £1,343,562. Rapid progress is being made towards bringing all sections of the mine into production. The ropeway linking the Fanti mine with the central mill should be completed in June.

Diamonds fell following the lead of Wall Street. The latest quarterly sales figures announced by De Beers are as high as £18,600,000 compared with £18,900,000 in the first three months of last year. Gem sales constituted a record of over £14,500,000. Excellent though these figures are, they failed to arrest the uneasiness of the market.

Coppers, like all other base metals, were again well down in spite of recent falls. Substantial selling found the market weak and all one way and dealers were unwilling to take much stock on their books. Informed opinion considers that a considerable fall in the metal price would have to take place before the mines were badly affected and it is worth remembering that many high cost producers would be forced to close down under these conditions.

Tin shares were heavily marked down following the slump in the metal price. On Wednesday afternoon a light rally occurred, but there were few enthusiastic buyers. Recent difficulties in the tin plate industry, however, have not helped this market. Nigerian issues followed Eastern prices despite columbite prospects. Rumours that the Nigerian mines were not receiving the premium price for this mineral were denied by the chairman of Amalgamated Tin.

Lead/zinc shares followed other commodities downwards although their metal prices were less affected than tin. The Australian government lifted all controls on the export of zinc and lead as from March 30.

FINANCE	Price April 8	+ or— on week
African & European	2⅜	.....
Anglo American Corpn.	6½	—⅛
Anglo-French	18/9	.....
Anglo Transvaal Consol.	27/6	.....
Central Mining (£1 shrs.)	33/9	.....
Consolidated Goldfields	48/-	—1/6
Consol. Mines Selection	26/3	.....
East Rand Consols	3/10½	.....
General Mining	4¼	—1/16
H.E. Prop.	41/3	+7½d
Henderson's Transvaal	7/6	—6d
Johnnies	3 1/16	—⅛
Rand Mines	4⅛	—¼
Rand Selection	35/7½	—1/3
Strathmore Consol.	41/6	—9d
Union Corp. (2/6 units)	31/-	—3d
Vereeniging Estates	4	—1/16
Writs	35/-	.....
West Wits	46/3	.....
RAND GOLD		
Blyvoors	42/9	—3d
Brakpan	13/-	—10½d
City Deep	25/7½	—1/3
Consol. Main Reef	27/6	.....
Crown	36/10½	—7½d
Daggas	3⅛	.....
Doornfontein	26/9	—6d
Durban Deep	46/10½	.....
E. Daggas	19/6	—1/-
E. Geduld .. (4/- units)	37/6	.....
E. Rand Props	3 1/16	—⅛
Geduld	4⅛	—1/16
Govt. Areas	14/-	.....
Grootvlei	26/-	—6d
Libanon	13/3	+1/9
Luipaards Vlei	28/-	—6d
Marievale	21/6	.....
Modderfontein East	18/9	.....
New Kleinfontein	25/-	.....
New Pioneer	23/9	—9d
Randfontein	45/-	—1/-
Robinson Deep	10/-	—3d
Rose Deep	15/7½	—1/3
Simmer & Jack	5/9	.....
S.A. Lands	28/9	+1/3
Springs	6/7½	—3d
Stilfontein	28/9	+7½d
Sub Nigel	2⅛	.....
Van Dyk	11/-	.....
Venterspost	17/-	+6d
Vlakfontein	16/3	.....
Vogelstruisbult	34/3	+1/-
West Driefontein	6½	.....
W. Rand Consolidated	3	+⅛
Western Reefs	50/-	—1/10½

O.F.S.	Price April 8	+ or— on week
Freddies	15/6	—1¼d
Freddies N.	14/10½	—1¼d
Freddies S.	14/10½	—1¼d
F. S. Geduld	3⅛	.....
Geoffries	19/-	—9d
Harmony	25/7½	—1¼d
Loraine	9/9	—3d
Lydenburg Estates	13/6	—3d
Merriespruit	6/3	—1¼d
Middle Wits	18/-	—6d
Ofsits	41/3	—7½d
President Brand	23/-	—1¼d
President Steyn	23/9	—3d
St. Helena	14/3	—3d
Virginia Ord.	13/9	—3d
Welkom	22/4½	—3d
Western Holdings	3 1/16	—⅛
WEST AFRICAN GOLD		
Amalgamated Banket	1/7½xd	.....
Ariston	6/6	—1¼d
Ashanti	23/6	+1/6
Bibiani	6/6	.....
Bremang	2/4⅜	.....
G.C. Main Reef	3/9	.....
G.C. Selection Trust	7/-	—1¼d
Konongo	2/10½	.....
Lyndhurst Deep	1/4½	.....
Marlu	1/1½	.....
Taquah & Abosso	3/9	—1¼d
AUSTRALIAN GOLD		
Boulder Perseverance	2/1½	—1¼d
Gold Mines of Kalgoorlie	10/9xd	—3d
Great Boulder Prop.	7/3	+3d
Lake View and Star	15/3	—3d
Mount Morgan	18/-	—6d
North Kalgurli	12/-	.....
Sons of Gwalia	6/6	.....
South Kalgurli	7/6	.....
Western Mining	11/9	—3d
MISCELLANEOUS GOLD		
Cam and Motor	9/1½	—3d
Champion Reef	5/-	—6d
Falcon Mines	7/6	.....
Globe & Phoenix	25/9	.....
G.F. Rhodesian	5/9	—3d
London & Rhodesian	4/7½	.....
Motapa	2/6	+1¼d
Mysore	3/-	—3d
Nundydroog	5/9	.....
Ooregum	3/1½	—1¼d
Oroville	10/6	.....

MISCELLANEOUS GOLD (contd.)	Price April 8	+ or— on week
St. John d'El Rey	26/6	.....
Zams	28/1½	—1/3
DIAMONDS & PLATINUM		
Anglo American Inv.	3⅛	—⅛
Casts	21/-	—1/9
Cons. Diam. of S.W.A.	4½	—¼
De Beers Defd. Bearer	61/3	—3/6
De Beers Pfd. Bearer	14	—¼
Pots Platinum	8/-	—7½d
Watervaal	15/-xd	—6d
COPPER		
Chartered	51/-	—2/-
Esperanza	4/-	—1¼d
Indian Copper	4/4½	—1¼d
Messina	3½	—⅛
Nchanga	5 1/16	—1/16
Rhod. Anglo-American	46/6xd	—4/-
Rhod. Katanga	9/3	—9d
Rhodesian Selection	14/3	—1/3
Rhokana	16/6xd	—1¼d
Rio Tinto	21⅛	—¼
Roan Antelope	13/-	—10½d
Selection Trust	33/9	—7½d
Tanks	56/10½	—4/4½
Tharsis Sulphur Br.	47/6	—1/3
TIN (Eastern)		
Ayer Hitam	21/10½	—3/10½
Bangrin	5/7½	—1/6
Gopeng	8/6	—1/3
Hongkong	7/6	—1/9
Ipoh	16/3	—1/3
Kamunting	9/-	—1/3
Kepong Dredging	5/6	—9d
Kinta Tin Mines	11/-	—1/9
Malayan Dredging	24/-xd	—2/9
Pahang	14/6	—1/10½
Pengkalen	7/6	—1/3
Petaling	10/-	—2/3
Rambutan	11/3xd	—2/3
Siamese Tin	18/9	—3/-
Southern Kinta	12/6	—1/10½
S. Malayan	24/-xd	—3/-
S. Tronoh	10/6	—1/-
Sungei Kinta	15/-	—1/3
Tekka Taiping	6/-	—1/3
Tronoh	20/-	—3/9
TIN (Nigerian and Miscellaneous)		
Amalgamated Tin	9/6	—2/-
Beralt Tin	24/6	—3/-
Bisichi	3/9	—1/-
British Tin Inv.	13/6	—2/1½
Ex-Lands Nigeria	4/-	—6d

TIN (Nigerian and Miscellaneous contd.)	Price April 8	+ or— on week
Geevor Tin	10/7½	—2/4½
Gold & Base Metal	3/7½	—7½d
Jantar Nigeria	12/6	—2/1½
Jos Tin Area	13/-	.....
Kaduna Prospectors	3/-	—3d
Kaduna Syndicate	3/3	—3d
London Tin	5/-	—4½d
United Tin	2/7½	—4½d
SILVER, LEAD, ZINC		
Broken Hill South	38/9	—3/9
Burma Mines	1/10½	—3d
Consol. Zinc	24/6	—1/10½
Lake George	10/-	—1/9
Mount Isa	31/3	—3/9
New Broken Hill	18/-	—1/3
North Broken Hill	48/9	—4/4½
Rhodesian Broken Hill	10/-xd	—1/6
San Francisco Mines	23⁹/9	—3/9
Uruwira	3/7½	—3d
MISCELLANEOUS		
BASE METALS & COAL		
Amal. Collieries of S.A.	45/6	.....
Associated Manganese	43/-	—7/-
Cape Asbestos	21/-	.....
C.P. Manganese	50/-	—8/-
Consol. Murchison	25/6	—4/6
Mashaba	6d	.....
Natal Navigation	3⅛	.....
Rhod. Monteleo	10/-	—3d
Turner & Newall	51/3	—2/-
Wankie	14/4½	—3d
Witbank Colliery	3 1/16xd	.....
CANADIAN MINES		
Dome	$37½xd	.....
Hollinger	$26½	—1½
Hudson Bay Mining	$95	—4
International Nickel	$74½	—½
Mining Corpn. of Canada	£4¾	—¼
Noranda	$136	—4
Quemont	£6½	—¼
Yukon	4/1½	+1½d
OIL		
Anglo-Iranian	5⅛	—¼
Apex	41/3	—1/3
Attock	26/10½	—1/1½
Burmah	43/1½	—2/10½
Canadian Eagle	32/-	—2/10½
Mexican Eagle	20/4½	—1½d
Shell (bearer)	4 1/16	—1/16
Trinidad Leasehold	27/6	—1/3
T.P.D.	25/-	—1/3
Ultramar	22/3	—1/9

COMPANY NEWS AND VIEWS

Record Gem Sales in March Quarter

De Beers Consolidated Mines have announced that the sales of diamonds effected through Central Selling Organization during the March Quarter of this year amounted to £18,573,208, of which sales of gem diamonds realized £14,507,190 and industrial stones £4,066,018. The net sales figure recorded for the sale of gems was the highest recorded in any one quarter. But the decline in the sales of industrial stones which represents a drop of about 12 per cent compared with the previous quarter and approximately 30 per cent below the March quarter of 1952 reflects a contraction in sales which has been going on since the end of the June quarter 1952.

Net sales of both gems and industrials in each quarter during the past two years together with the first quarter of the current year are given in the table below.

1951	*Gems* £	*Industrial* £	*Total* £
March Qtr.	11,296,231	2,887,817	14,184,048
June Qtr.	14,190,251	6,221,976	20,412,227
Sept. Qtr.	10,476,858	4,621,082	15,097,940
Dec. Qtr.	10,817,292	4,546,457	15,363,749
Total	46,780,632	18,277,332	65,057,964
1952			
March Qtr.	13,088,113	5,780,352	18,868,465
June Qtr.	11,284,240	8,136,752	19,420,992
Sept. Qtr.	10,058,235	5,353,927	15,412,162
Dec. Qtr.	11,339,269	4,621,038	15,960,307
Total	45,769,857	23,892,069	69,661,926
1953			
March Qtr.	14,507,190	4,066,018	18,573,208

The sales total for 1952 of £69,661,926 was the highest ever recorded. But sales during the current year, if maintained at the level obtained during the March quarter, would be equivalent to nearly £74,300,000 per annum.

Editorial comment will be found under Notes and Comments in this issue.

Amalgamated Banket Areas Pay 5 per cent.

Sales of gold by Amalgamated Banket Areas during the year to September 30 last resulted in a record net bullion revenue of £1,343,562, an increase over the previous year of £184,150. But mining costs rose by an additional £236,408 compared with the preceding year, thereby denying the company of the full benefits of this greater output.

Year to Sept. 30	*Tonnage Milled (Total)*	*(Per Month)*	*Grade (dwt.)*	*Recovery %*	*Yield oz.*	*Cost per ton** s.	d.
1952	635,999	53,000	3.4	95.7	103,523†	33	10
1951	656,545	54,712	2.9	95.3	93,749	26	7

* Including development charges
† Including 567 oz. gold recovered from slags

With regard to the completion of the aerial ropeway scheme, the chairman, Major General W. W. Richards, in his statement accompanying the accounts said that every effort is being made to complete the construction and erection of the final ropeway linking the Fanti Mine with the Central Mill. It is hoped that this will be completed in June next and that after the necessary running-in period a substantial revenue will be earned from this source.

The initial running-in difficulties of the new ropeway in the Tamsoo section, the report states, have been overcome and it is now able to deal with the full tonnage fed to it which for the year averaged 9,000 tons per month. This tonnage averaged 5,000 tons from underground sources and 4,000 tons from surface dumps per month. While the surface dumps are now nearing exhaustion, underground tonnage is steadily increasing, and at the year-end had reached 7,500 tons per month. It is expected that the target figure of 10,000 tons of underground ore per month in the Tamsoo section will be reached this year.

Total ore reserves are computed at 3,979,173 tons. Of this tonnage, 2,054,033 tons averaging 5.5 dwt. over a width of 40.5 in. represented the underground ore reserves and 1,749,208 tons averaging 1.9 dwt. the surface deposit at Pepe; the balance of 175,932 tons at 0.7 dwt. being the value of the parting reef at Pepe.

Year to Sept. 30	*Bullion Revenue** £	*Mining Costs* £	*Other Expenses* £	*Net Profit* £	*Dividend* %	*Carry Fwd.* £
1952	1,343,562	1,000,407	204,236	139,819	5	196,559
1951	1,159,412	763,999	168,682	227,497	2½	202,867

* Less realization charges

As noted in our issue of March 27 net profit amounted to £139,819 compared with £227,497, and that the dividend distribution at 5 per cent per 3s. share on the issued capital of £2,884,900 was double that paid in the preceding year.

Konogo's Good Development Results

Konongo Gold Mines, the high grade West African gold producer whose financial results for the year ended September 30 last were given in our issue of March 27, has now published its full report and accounts.

With its small tonnage throughput Konongo's fortunes depend on the maintenance of a much higher than average grade of ore being sent to the mill. This condition has been adequately fulfilled in recent years—the greater part of the tonnage crushed being extracted from the Odumase reef. This reef has, however, been tending towards lower values so that interest has become centred on the opening up of the company's Boabedroo section which gives every indication of enabling the mine to continue milling high grade ore.

During the year to September 30 last, driving in the Boabedroo section on levels 4, 6 and 10 was continued and since the end of the financial year driving has commenced on level 11. Although results obtained on levels 4 and 6 have not been in any way impressive, excellent results were obtained on level 10. Of 485 ft. driven, 470 ft. averaged 14 dwt. per ton over a width of 128 in., the total length of ore shoot on this level now being proved at 523 ft. averaging 17.5 dwt. over a width of 122 in. This work, states the consulting engineers' report, taken in conjunction with that previously done on level 9, indicates a high grade block of ore of some 31,000 tons averaging 24.1 dwt. per ton over a stoping width of 86 in. The significance of this exposure is apparent when it is considered that total tonnage milled at Konongo during the year under review was only 29,960 tons, from which 26,897 oz. of gold were produced. No. 11 level is being opened up by driving from winzes sunk from level 10 and results are promising.

Although milling costs per ton have increased from 12s. 1½d. to 24s. 6d. during the past four years, which was due partly to the progressively decreasing tonnage milled and partly to the steadily increasing costs of labour and stores, the extraction cost during the year under review at 26s. 4d. per f.oz. gold produced compares closely with previous years. Ore reserves available for stoping at the end of September last totalled 118,135 tons valued at 17.7 dwt. per ton over a width of 60 in.

As previously stated, net profit for the year, after providing for all charges, including taxation liabilities of £89,500 £104,000) was £52,991 compared with £67,259 in the preceding year. The dividend was maintained at 10 per cent per 2s. share on the issued capital of £619,258. The carry forward was £57,061 compared with £60,855 brought in.

Company Shorts

Burma Mines Makes Small Profit.—Burma Mines have announced a net profit of £189, subject to taxation, in respect of the 18 months ended December 31, 1952. In this connection it should be borne in mind that the company did not trade and made neither a profit nor a loss during the period prior to July 1, 1951.

Shareholders are reminded that apart from an aggregate of about £150,000 in cash and British Government Securities, the company's main asset is the holding of 3,159,730 fully paid "B" shares of K.10 each in Burma Corporation (1951) Ltd., representing one half of the issued capital of that corporation, and that the period covered was for the corporation inevitably one of limited production, continuous plant rehabilitation and staff and labour recruitment.

Hartebeestfontein's Borehole Result.—Hartebeestfontein Gold Mine announce the following results obtained in borehole HB22, situated on Farm Hartebeestfontein No. 41 approximately 4,500 ft. east-north-east of borehole HB5. This borehole was drilled for the purpose of obtaining structural information.

The Vaal Reef was intersected at a borehole depth of 2,676 ft. assaying 51.8 dwt. over a corrected width of 5.15 in., equivalent to 267 in.-dwt. Core recovery was complete. A deflection is being drilled to obtain a second intersection.

St. John d'el Rey Maintains Dividend on Increased Capital.—St. John d'el Rey Mining Company in a preliminary profit statement have announced the payment of 1s. 6d. per £1 stock net on the ordinary stock, making 10 per cent net for the year 1952. This is the same payment as was made in 1951 although it has been distributed on an issued capital increased by a "rights issue" made in May last of one ordinary share for every £14 ordinary stock held, at a price of 21s. per share.

The figures in the following table relating to the year 1952 are subject to audit.

Year to Dec. 31	*Working Profit*	*Depreciation*	*Taxation*	*Net Profit*	*Dividend*	*Carry Fwd.*
	£	£	£	£	%	£
1952	321,023	69,327	152,543	99,153	10	53,692
1951	347,402	70,611	162,559	114,232	10	53,680

The annual meeting will be held in London on June 11. Dividends will be paid on June 12 to those registered on May 18.

Griqualand West Diamond Mining Company, Dutoitspan Mine.—The report and accounts of Griqualand West Diamond Mining Company, Dutoitspan Mine, for the calendar year 1952 shows that the usual half-yearly dividends at the rate of 4 per cent per annum, less tax, were paid to shareholders.

Year to Dec. 31	*Gross Revenue*	*Expenses*	*Tax*	*Net Profit*	*Dividend*	*Carry Fwd.*
	£	£	£	£	£	£
1952	43,150	300	12,656	30,194	29,596	8,985
1951	43,156	300	11,534	31,322	30,653	8,387

The annual meeting will be held in Kimberley on April 24.

New Jagersfontein Mining and Exploration Company.—The report and accounts of New Jagersfontein Mining and Exploration Company for the calendar year 1952 showed that a total of 5 per cent was paid to shareholders.

Year to Dec. 31	*Gross Revenue*	*Expenses*	*Tax*	*Net Profit*	*Dividend*	*Carry Fwd.*
	£	£	£	£	£	£
1952	52,635	4,368	5,767	42,500	42,500	48,267
1951	49,541	2,757	4,284	42,500	42,500	46,784

The directors in their report state that there has been no improvement in the grade of the mine which remains at between 6 and 7 carats per 100 loads, and that the results of prospecting work continue to be disappointing.

In terms of its undertaking to increase the annual rental during the currency of the agreement with De Beers Consolidated Mine to enable the company to maintain dividends at the rate of 5 per cent per annum, so long as, in its opinion, there are no material changes affecting the position, De Beers Company paid an additional rental last year amounting to £3,714 making a total of £52,362

Meeting Kimberley April 24. Mr. E. H. Farrer is chairman.

Consolidated Company Bultfontein Mine.—The report and accounts of Consolidated Company Bultfontein for the year 1952 show that the usual half yearly dividends at the rate of 7½ per cent per annum, less tax, were paid to shareholders.

Year to Dec. 31	*Gross Revenue*	*Expenses*	*Tax*	*Net Profit*	*Dividend*	*Carry Fwd.*
	£	£	£	£	£	£
1952	59,978	1,117	15,976	42,885	43,290	29,112
1951	60,048	1,150	14,581	44,317	44,643	29,517

The annual meeting will be held in Kimberley on April 24.

Ooregum Gold Continues Working.—John Taylor and Sons (India), managers of the Ooregum Gold Mining Company of India (KGF), have announced that as a result of the marked falling off in the output of gold from the mine since August 1952 and the decline in the price of gold, losses are being incurred by the Ooregum KGF Company. In consequence the directors have regretfully decided to stop working the Ooregum Mine.

It was proposed to close the mine on March 23, 1953. As, however, the closure will affect about 3,600 employees and their families, the Government of Mysore and the Government of India have advised the directors that a committee is being appointed in this connection and have suggested that the mine may be kept working to allow time for the committee to meet and make its recommendations.

In deference to this advice the directors have agreed to postpone the date of closure to May 31, 1953, and in response to an invitation they have nominated a representative to the committee.

ANGLO-FRENCH EXPLORATION COMPANY, LIMITED

CHAIRMAN'S SPEECH

The Sixty-third Annual General Meeting of The Anglo-French Exploration Company, Limited, was held on April 1 in London.

The Chairman, **Mr. F. R. Cottell, A.C.A.,** in the course of his speech, said:

Our investments stand in the books at £988,072 and are valued at £1,191,973, an excess of £203,901. The following is a classification of our investments based on the valuation at December 31, 1952:—

Gold Mining (including holding companies which have substantial interests in gold mining companies)	61.7%
Oil	12.0%
Copper, lead, zinc	9.7%
Tin	9.8%
Coal	6.5%
Miscellaneous	0.3%

In the profit and loss account you will observe that the welcome increase in our dividend income which was disclosed in 1951 has continued during 1952. In particular, our tin mining holdings as a whole have continued to yield excellent dividends. On the other hand, due to rising costs, shortage of native labour and other difficulties, the return from our gold mining investments has declined slightly; however, we look for improvement in our income from this source when developing mines in which we have substantial interests reach the dividend paying stage. Profit realized by sales is down by some £16,000 but I would point out that this item is always liable to fluctuations. Expenses at £16,646 show a fall of approximately £1,500, taxation takes a sum of £38,368 and, after applying £8,733 in reduction of the book value of investments, the profit is £31,938 and a dividend for the year of 7½ per cent is recommended.

The severe inflation which this country has experienced over a number of years has served to conceal the harmful effects on industry of a taxation policy which extracts an excessive proportion of profits for the use of the State. While it is to be hoped that in the long term interest of the country a more enlightened policy will be adopted in the future, it will not be possible to give any effective relief to industry without a drastic curtailment of government expenditure and there is as yet no sign that any substantial effort is to be made to deal with this most oppressive burden on the economy of the country.

The price of gold in United States currency is still fixed at $35 per fine ounce. I do not think I can usefully add to what I have said at our previous meetings regarding the failure to deal internationally with the depreciation of paper currencies in relation to the price of gold metal, except to point out that knowledgeable opinion is becoming more favourable to the view that a world wide rise in the price of gold is one of the essential requirements if a number of desirable and necessary objects are to be achieved, amongst which can be mentioned adequate gold reserves, convertibility of currencies, exchange stability and non-discrimination in international trade. Unfortunately, there is no sign as yet of a change in the United States official attitude which is antagonistic to an increase in the dollar price of gold, although this cannot disguise the position that the paper dollar has in fact depreciated by some 50 per cent compared with 1939, or to put it in another way, that its real worth is now only one half of its pre-war value in terms of commodities. It is to be hoped that the Commonwealth countries, and in particular the United Kingdom, will present with vigour to the United States authorities the case for a change in the value of the currencies of all members of the International Monetary Fund, in order to bring those currencies more into line with their real value in terms of gold.

Much attention is being given at present to the prospects of those gold mines in the Transvaal and in the Orange Free State which are scheduled to produce uranium as well as to the mines which might be expected to become uranium producers. It is evident that the exploitation of these uranium resources will be a matter of very considerable importance, for it was stated in October last by Dr. Malan, Prime Minister of the Union of South Africa, that the eventual gross revenue from the 13 uranium plants authorized at that date would probably be not less than £30,000,000 per annum. However, no information has been released from which estimates of profits could be attempted and it will probably be necessary, therefore, to await the actual results of operations before it will be possible to assess the importance of uranium production in relation to the dividend prospects of individual mines. It will be noted from the directors' report that your company is interested in several mines which are scheduled to commence uranium production in the near future.

The report and accounts were adopted.

CROWN MINES, LIMITED

(Incorporated in the Union of South Africa)

Extracted from the Annual Report for the Year Ended 31st December, 1952

Capital : £1,000,000 in 10s. Shares. £943,062 10s. issued, fully paid

		Per ton milled
Tons milled 3,253,000		
Total Working Revenue	£6,634,619	£2 0 9
Total Working Expenditure	5,985,946	1 16 9
Working Profit	£648,673	£0 4 0
Total Profit for the year		£ 695,793
Balance unappropriated at 31st December, 1951		1,166,964
Transfer from Shareholders Contingency Reserve		35,300
		£1,898,057
This amount has been dealt with as follows :—		
Funds transferred for Capital Expenditure	£165,752	
Taxation	9,320	
Forfeited Dividends Account	35,271	
Dividends declared during the year—No. 102 of 2s. 6d. per share and No. 103 of 2s. 6d. per share	471,531	
		681,874
Leaving a balance unappropriated of		£1,216,183

The ore reserve at the 31st December, 1952, was re-estimated as follows :—

Reef	Available			Shaft and Safety Pillars			Total		
	Tons (000s)	Value Dwt.	Width Inches	Tons (000s)	Value Dwt.	Width Inches	Tons (000s)	Value Dwt.	Width Inches
Main Reef Leader	7,657	4.4	48.2	3,702	5.9	47.2	11,359	4.9	47.9
South Reef ..	978	3.7	47.7	834	4.5	52.3	1,812	4.1	49.7
Total ..	8,635	4.3	48.2	4,536	5.7	48.0	13,171	4.8	48.1

Compared with the previous year the available reserve decreased by 409,000 tons, the width being 0.1 inch higher and the value unaltered.

The full Report and Accounts may be obtained from the London Secretaries, A. MOIR & CO., 4 London Wall Buildings, E.C.2.

DURBAN ROODEPOORT DEEP, LTD.

(Incorporated in the Union of South Africa)

Extracted from the Annual Report for the Year Ended 31st December, 1952

Capital : £1,200,000 in 10s. Shares. £1,162,500 issued, fully paid

		Per ton milled
Tons milled 2,168,000		
Total Working Revenue	£4,768,443	£2 4 0
Total Working Expenditure	3,638,342	1 13 7
Working Profit	£1,130,101	£0 10 5
Net Profit for the year		£1,116,170
Balance unappropriated at 31st December, 1951		867,085
Transfer from Shareholders Contingency Reserve		2,300
		£1,985,555
This amount has been dealt with as follows :—		
Funds Transferred for Capital Expenditure	£363,590	
Taxation	296,696	
Forfeited Dividends Account	2,337	
Dividends declared during the year—No. 63 of 2s. 6d. per share and No. 64 of 2s. 0d. per share	523,125	
		1,185,748
Leaving an unappropriated balance of		£799,807

The ore reserve was re-estimated, as at the 31st December, 1952, as follows :—

Reef	Available			Shaft and Safety Pillars			Total		
	Tons (000s)	Value Dwt.	Width Inches	Tons (000s)	Value Dwt.	Width Inches	Tons (000s)	Value Dwt.	Width Inches
Main Reef ..	5,768	4.5	63.8	683	4.2	67.1	6,451	4.4	64.2
Main Reef Leader	46	4.8	37.9	22	3.7	40.5	68	4.4	38.7
South Reef ..	1,034	3.6	42.0	122	4.4	41.3	1,156	3.7	41.9
Kimberley Reef	1,140	3.5	62.7	—	—	—	1,140	3.5	62.7
Total ..	7,988	4.2	59.5	827	4.3	60.5	8,815	4.2	59.5

Compared with the previous year, the available reserve declined by 560,000 tons, which includes a decline of 238,000 tons due to the new pay limits dictated by the higher working costs.

The full Report and Accounts may be obtained from the London Secretaries, A. MOIR & CO., 4 London Wall Buildings, E.C.2.

Mining Matters

The Cornish Institute of Engineers will hold their annual general meeting in the lecture theatre of the Camborne School of Mines on April 29 at 7.15 p.m. After the formal business of the meeting has been concluded the following short papers will be introduced for discussion :—" The Brideford Baryta Mine," by Mr. J. P. R. Polkinghorne ; " Tungsten Carbide in Rock Drilling with special reference to Tipped Steels," by Mr. A. Langford ; and " The Filing and Care of Mine Plans," by Mr. R. G. Head.

London Metal Exchange Committee :—The London Metal Exchange has announced that at the annual election of the committee of subscribers the following were elected to serve for the ensuing year — namely, April 25, 1953, until April 24, 1954 :— Messrs. F. O. P. Becker, V. S. Booth, W. G. Buchanan, G. F. A. Burgess, F. C. Chisnell, W. K. Davey, R. T. de Poix, H. J. Goodall, L. Guy, T. B. Henderson, W. E. Lucas, P. G. Smith, W. O. Stern, F. F. Wolff and D. S. Woodbridge.

Lt. Col. R. L. Broad following upon his appointments as chairman of New Union Goldfields, Merchants' Industrial Corporation and Witwatersrand Deep, and as a director of other mining concerns, has also been appointed chairman of Lydenburg Goldfarms New Free State Gold Estates, New Nigel Estate and Gold Mining Co., New Witwatersrand Gold Exploration Co., West Rand Development and Exploration and Wit Extensions. Colonel Broad has also become a director of Village Main Reef Gold Mining Co. and Jeannette Gold Mines.

Major-General W. W. Richards has been appointed to the Board of Gold and Base Metal Mines of Nigeria and, following his appointment, was elected chairman.

GEOLOGISTS, DEPARTMENT OF SCIENTIFIC AND INDUSTRIAL RESEARCH. The Civil Service Commissioners invite applications for about three pensionable appointments at the Geological Survey and Museum. Age at least 21 and under 30 (31 for permanent members of the Experimental Officer Class) on May 1, 1953. Candidates must have obtained (or obtain in summer 1953) a university degree with first or second class honours in Geology or an equivalent qualification or possess high professional attainments.

Two of the appointments will be, in the first place, in the palaeontological and geophysical departments.

Inclusive London salary scale (men) £440—£707; (women) £440—£576 (somewhat lower in provinces). Higher starting pay may be granted for approved post-graduate experience. Prospects of promotion. Further particulars and application forms from Civil Service Commission, Scientific Branch, Trinidad House, Old Burlington Street, London, W.1, quoting No. S168/53. Application forms to be returned by May 14, 1953. 20837/180/EP

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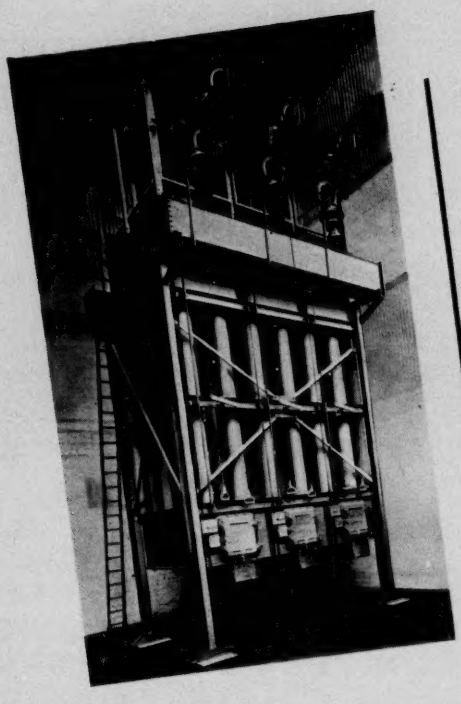

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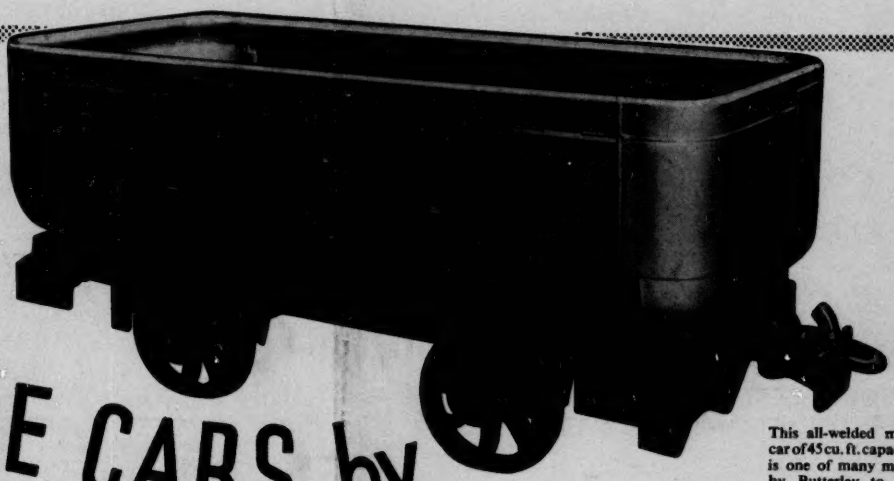

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